



Operation and Instruction Manual

No. 52981

Ex-Cell-O
Style 602
Ram Turret
Milling Machine

Forward

Your Ex-Cell-O mill is a precision machine tool. To assure continuous satisfactory service, proper installation, operation and maintenance procedures should be followed. This manual is printed with this in view. It should be placed in the hands of the relevant plant supervisor. The information it contains should be studied and followed carefully.

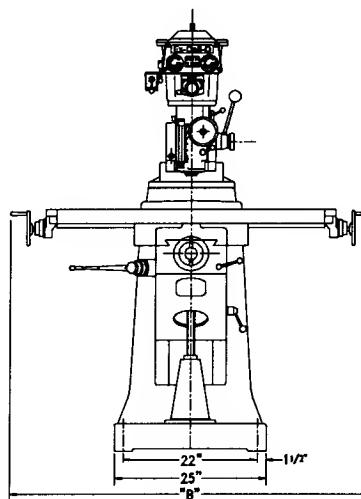
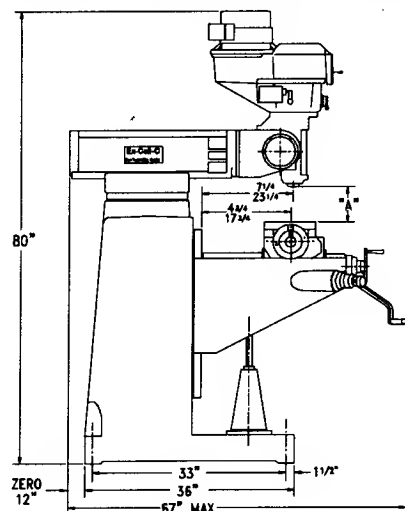
This milling machine was designed and manufactured to conform to Ex-Cell-O's high standard of machine tool performance. It was built to rigid specifications by trained workmen using the best material available and inspected at various stages of construction.

Because of constant improvement in design, equipment and materials, some details of your machine may differ from the description in this manual.

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Machine Specifications



	IN.	(MM)	IN.	(MM)	IN.	(MM)
Table Length.....	36	(914.4)	42*	(1066.8)	48*	(1219.2)
Table Width.....	9	(228.6)	9	(228.6)	9	(228.6)
Overall Width.....	B. Max. 78	(1981.2)	90	(2286.0)	102	(2590.8)
Table Longitudinal Travel – Manual.....	25	(635.0)	31	(787.4)	37	(939.8)
Table Longitudinal Travel – Power Feed*..	21 1/4	(589.7)	27 1/4	(692.1)	33 1/4	(844.5)
Table Cross Travel.....	16	(406.4)				
Table Vertical Travel.....	16	(406.4)				
Ram Travel.....	16	(406.4)				

Spindle Nose to Top of Table:

All Spindles – A Min.....	0	
R8-No. 40 MMT – A Max.....	18 1/2	(469.9)
Quick Change Spindle – A Max.....	17 1/4	(438.1)

Head Swings Across Table (Worm & Gear Adj.)..... 45° Forward 45° Backward

Head Rotates in Line with Table (Worm & Gear Adj.)..... 90° Each Side of Vertical

Turret Rotates..... 360°

Table Dial Graduations..... .001 (.02mm)

..... 3 – 11/16 (17.4625)

"T" Slot Center Distance..... 2 3/8 (60.3)

Spindle Taper – R8.....	#40 Standard Milling Machine Taper *
– #30 "Erikson" Quick Change *	#300 "Universal" "Kwik Switch"
– #40 "Erikson" Quick Change *	1 1/8 "Beaver" Quick Change *

Spindle Speed – Infinitely Variable – 1800 RPM Motor: Low Range – 85 to 640 RPM
High Range – 540 to 4000 RPM
1200 RPM Motor *: Low Range – 55 to 425 RPM
High Range – 360 to 3665 RPM

Spindle Rotation..... Reversible

Spindle Motor HP and RPM..... (1 1/2 – 1800) (2 * – 1800) (1 1/2 * – 1200)

Spindle Brake – Manual..... Lever – Locks for Tool Change

Quill Power Feed..... .0015 (.0381), .003 (.0762) and .006 (.1524) per Rev. of
Spindle – Reversible

Quill Hand Feed..... Lever – 8 Operating Positions; Handwheel – For Fine Feeds

Quill Lock..... Lever

Quill Stroke..... 6 (152.4)

Quill Diameter..... 3 9/16 (90.4)

*Optional Items Specifications subject to change without notice

Installation

EX-CELL-O RAM TURRET MILLING MACHINE - STYLE 602

Preparing Machine for Installation:

When machine is uncrated, check all parts and accessories against the packing list to make sure nothing is missing.

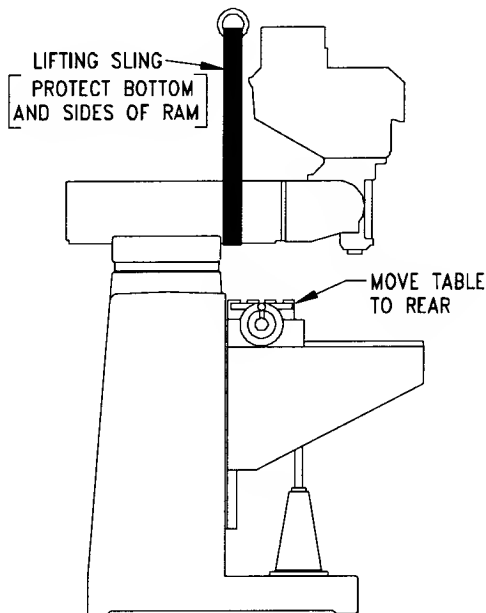
The following items are shipped with each machine:

- (1) Inspection Report
- (1) Wiring Diagram (not with class "A" Electrics).
- (1) Packing Slip
- (1) Double End Box Wrench $\frac{3}{4}$ " AF x $\frac{15}{16}$ " AF
- (1) Special Allen Wrench $\frac{5}{16}$ " AF

After the machine is uncrated, it must be inspected to ascertain that no part has been damaged or disarranged during shipment. All wrappings that have been used to prevent dust and dirt from ingressing should be removed. The wooden skids should be left on the machine until it is placed in position.

When a crane is used to lift the machine into position, the lifting sling should be placed around the front of the ram. (See diagram below).

Caution must be exercised, during the installation of the machine, that no force is exerted on the spindle, as the closely fitted precision ball bearing could be damaged.



Net Weight:
2900 lbs. - 2 H.P., 48" Table, Table Feed.

Install Table Dials and Handwheels:

On some models, dials and handwheels are shipped loose. Assemble as shown in "Machine Assembly" (page 25) to give .005 gap between jam nut and dial.

Foundation:

For optimum performance, the machine should be mounted on a solid vibration free foundation and accurately leveled. Any conventional method of machine mounting is acceptable, i.e. steel shim, rubber vibration isolators, felt pads, etc. Neither steel wedges or spring isolators should be used.

Cleaning:

Thoroughly remove oil based protective coating from machine ways and lubricate (see page 9) before making any machine movements.

Operating Instructions

EX-CELL-O RAM TURRET MILLING MACHINE - STYLE 602

A. Spindle Start-Stop-Reverse:

Located on the left side of head and is used to obtain clockwise and counter clockwise rotation of spindle.

B. Spindle Brake & Lock:

Applied by moving lever on left side of belt housing. To lock spindle when changing tools, move lever to the horizontal position. **CAUTION:** The motor can be damaged if it is turned on while the brake lever is in the horizontal (lock) position.

C. Spindle Speed Selector:

CAUTION: Dialing spindle speed must be performed only while motor is running. Infinite spindle speed is obtained by dialing speed selector clockwise for faster speeds, and counter clockwise for slower speeds, and reading desired spindle speed on the direct reading speed dial. In high range, any speed from 540 R.P.M. to 4000 R.P.M. may be selected and in low range any speed from 85 to 640 R.P.M.

D. Spindle Speed Dial:

Approximate spindle speed is indicated in R.P.M. Read spindle R.P.M. opposite range in which machine is operating.

E. High-Low Spindle R.P.M. Selector Lever:

CAUTION: Motor must be stopped before engaging or disengaging selector lever.

F. Quill Lock:

The quill may be locked in any position by rotating the lock lever clockwise.

G. Quill Hand Lever:

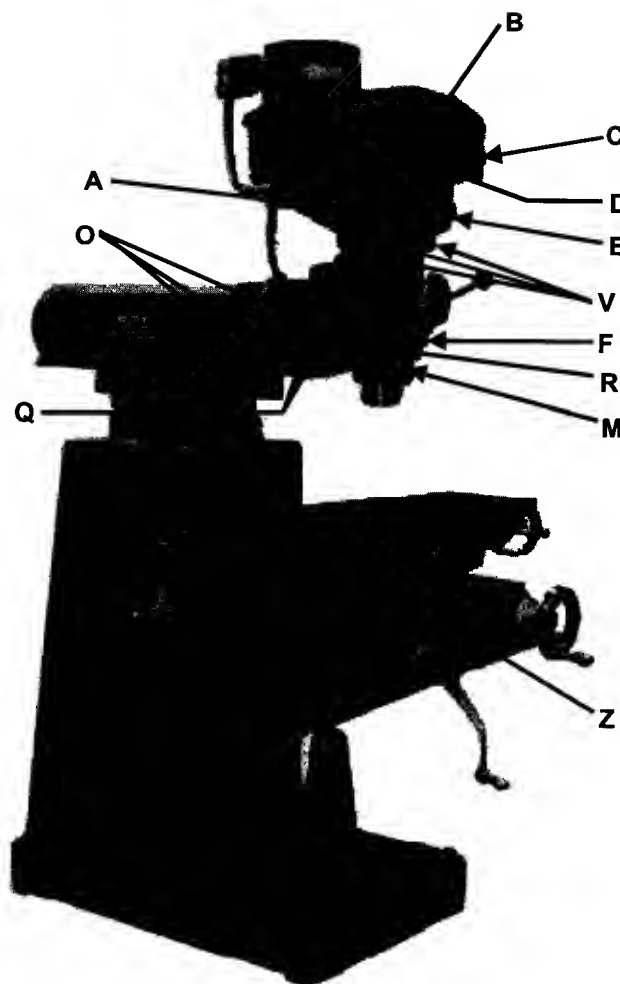
Adjustable to 8 operating positions by moving outwards on lever hub and turning to desired position.

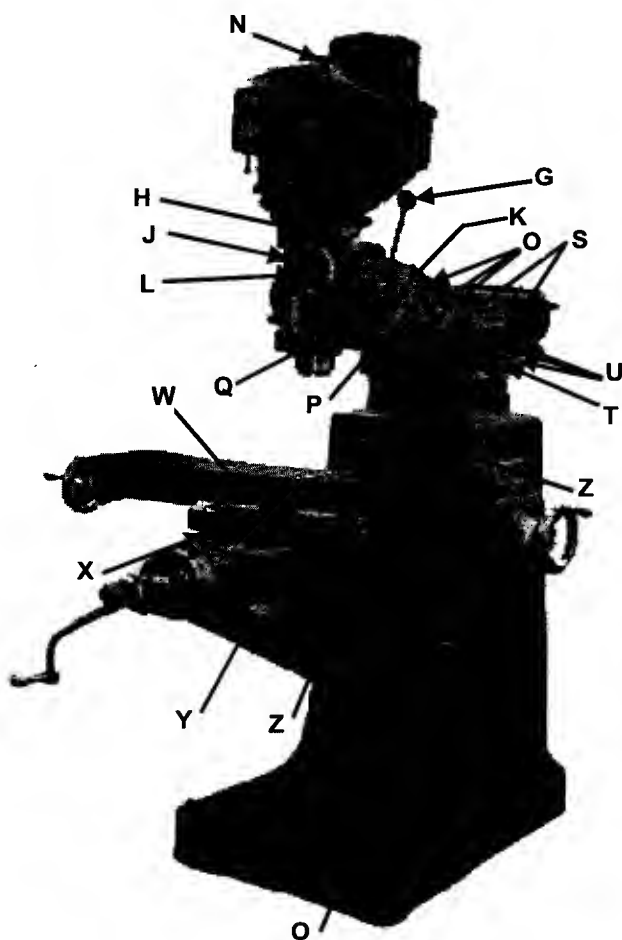
H. Power Feed Selector:

Quill feeds per revolution of spindle may be selected by turning lever to the desired feed setting. A neutral position is provided between each feed setting. When power feed is not required, selector should be in the neutral position. Feed selections are more easily made when spindle is running. **CAUTION:** Feed selector should not be turned when quill is under load. Disengage power feed clutch first.

J. Fine Feed Hand Wheel:

Operated by turning power feed selector to neutral position and engaging power feed clutch.





K. Power Feed Reversing Knob:

NOTE: Clutch knob has a left-hand thread.

Power feed to quill is engaged by turning clutch knob counter clockwise. When light feeding forces are required, the knob can be tightened easily by grasping it directly. When higher thrust, up to the limit of the head are required, the tightening is effected easier by sliding the hand feed lever to the right so that it engages the feed knob in one of 8 positions. The greater the force applied to the lever - the proportionally greater feeding force is applied to the quill.

L. Power Feed Reversing Knob:

Located in the center of the fine feed handwheel. Pull knob out to feed down, push in to feed up.

M. Quill Stop & Micrometer Nut:

Depths may be controlled by setting micrometer nut in conjunction with quill stop.

N. Draw Bar:

When tightening or loosening the draw bar, use spindle brake to lock spindle.

P. Angular Setting of Head: Side to Side

Loosen six locking screws "O" and adjust head to desired setting by turning shaft "P".

R. Angular Setting of Head - Front to Rear:

Loosen six screws "Q" - three on either side of head and adjust to desired setting by turning shaft "R".

NOTE: For full movement to rear, upper portion of head must be rotated as described in "V".

T. Positioning of Ram - Front to Rear:

Loosen two screws "S", two screws "U" and move ram towards front or rear by rotating shaft "T".

U. Turret Rotation:

To rotate turret, loosen three screws "U", rotate ram and turret and tighten screws.

V. Rotation of Upper Portion of Head:

This could be an advantage when head is tilted into various positions to give greater clearance for the drive or to position the controls in a more accessible position.

This joint occurs between the quill housing and gear housing. Loosen four screws "V" in the top flange of the quill housing (Body) and rotate the top portion of head to desired position. Retighten the four screws.

W. Table Clamp:

X. Cross-Slide Clamp:

Y. Knee Clamps:

NOTE: The table, cross-slide and knee should be clamped when not being used to insure a rigid set up.

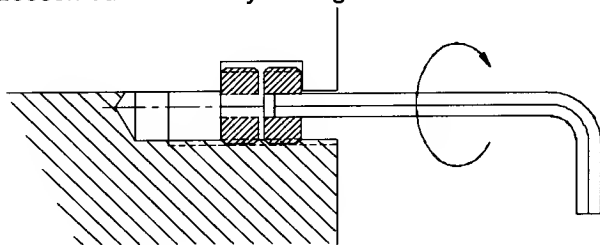
Set Up Adjustments

Z. Gib Adjusting Screws:

Full length tapered gibs are used on the dovetails of the style 602 Milling Machine. Adjust gibs by turning adjusting screws until a slight drag is felt when turning the handwheel. Adjusting screws are located in the following locations: at the right hand end of the cross slide, front of cross slide through clearance hole in way wiper and on the right hand corner of knee.

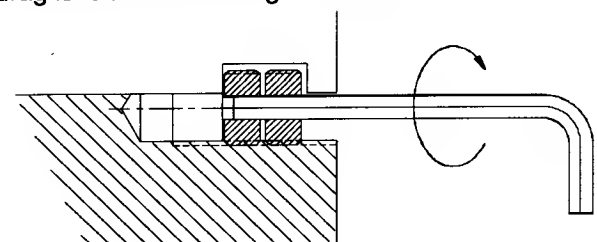
UNLOCK GIB:

Loosen outer screw by turning clockwise.



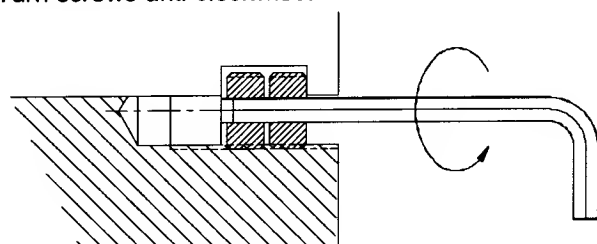
TIGHTEN GIB:

Pass key through outer screw and into inner screw. Tighten screws by rotating clockwise until a slight drag is felt when rotating handwheel.



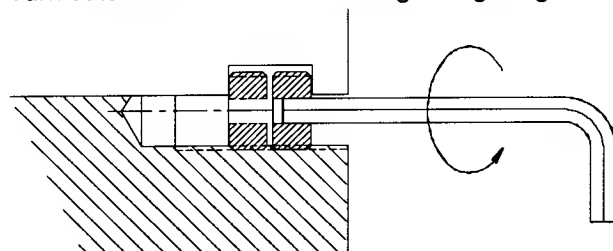
LOOSEN GIB:

Turn screws anti-clockwise.



LOCK GIB:

Turn outer screw anti-clockwise against gib lug.



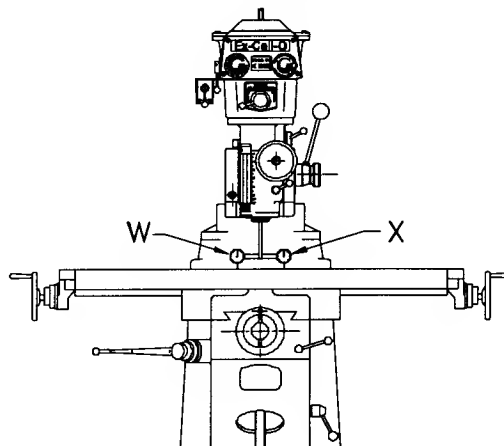
Adjusting Optional Lead Screw Back Lash Eliminator

See page 32

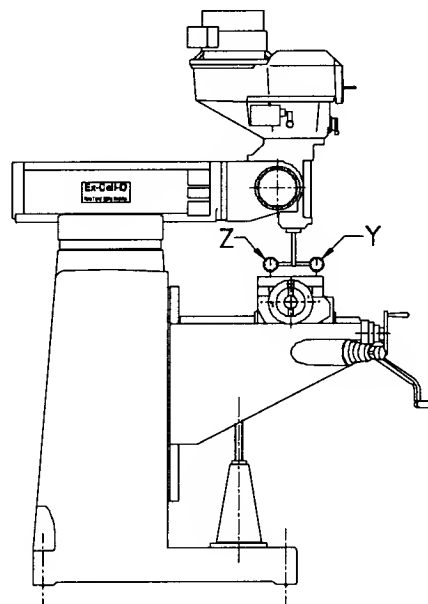
Head Alignment for Precision and other accurate Machining.

The graduated scales provided are for reference. To set up the head for precision machining operations, proceed as follows:

Place dial indicator in spindle nose.



Loosen (6) clamp screws "O" and rotate head by worm shaft "P", until identical readings are obtained on the indicator at "W" and "X". Tighten clamp screws and check indicator reading.



Loosen (6) clamp screws "Q" and rotate head by worm shaft "R" until identical readings are obtained at "Y" and "Z". Tighten clamp screws and check indicator readings.

Service Instructions

Ordering Instructions:

When ordering replacement parts the following information should be forwarded.

1. Part Number and Assembly Number
2. Name of Part
3. Quantity
4. Serial Number of Machine

To order a replacement not found in any of the following lists; a complete description, and if necessary a sketch, should be forwarded with quantity and serial number of machine.

Operating Temperature of Head:

Normal temperature rise at 4000 R.P.M. is 75 degrees F. above ambient. If substantially higher head temperatures are encountered check adjustment of brake.

Spindle Brake and Lock Adjustment:

Ref. Sec. BB, page 14

1. Remove Cam Screw 52-12584 and Brake Cam 52-12582.
- 2a. Rotate brake lock stud 52-11888 ½ turn clockwise to increase brake pressure.
- 2b. Rotate anti-clockwise ½ turn if brake shoe is dragging.
3. Assemble brake cam and cam screw.
4. Check brake. Repeat above if additional adjustment is required.

Spindle Belt Replacement

Ref. page 14

1. Adjust spindle speed to 800 R.P.M. with motor running. (If belt is not broken)
2. Disconnect power supply at mains. Remove reversing drum switch (2) 5/16"-18 cap screws Det 73 from vari speed housing. Let switch hang.
3. Remove (4) 1/4"-20 cap screws (2) Det 53 and (2) Det 61 in front. Remove cover by pulling straight out.
4. Remove (3) 3/8" -16 hex head screws Det 55 and (3) 3/8" -16 square nuts from motor. Be careful not to misplace nuts.
5. Tilt motor to rear of vari speed housing and wedge a piece of wood between the two halves of the spring loaded vari speed pulley Det 150. Lift motor up and slip the belt over the vari speed pulley and place motor upside down on top of ram.
6. Remove (4) 3/8"-16 cap screws Det 47 and safety washer Det 170 from underside of vari speed housing. Remove (2) 5/16" dowel pins from vari speed housing and remove housing from gear box.
7. Lift sliding vari disc 52-12008 and gimbol ring assembly 52-20037. Remove old belt and replace with new one in approximately same position as old belt.

Installation:

8. Assemble vari speed housing. Replace cap screws, safety washers and dowel pins.
9. Assemble motor and slip belt between two halves of vari speed pulley. Remove wedge and replace hex head screws and square nuts.
10. Assemble front cover and make sure fork is located in the gimbol ring assembly. Replace cap screws.
11. Assemble reversing drum switch bracket to vari speed housing. Replace cap screws.
12. Start motor and check that speed selector mechanism functions correctly over whole speed range.

Instructions for Replacing Quill Return Spring:

Ref. Sec. EE, page 20

1. Place a piece of wood on the table for protection and position the table approximately 6½" below the spindle nose.
2. Loosen set screw, Det. 124, which holds the top of the stop screw No. 52-11873. Unscrew stop screw approximately 4 inches. Remove stop block No. 52-11872 by removing Soc. Hd. Scr. Det. 125.
3. Move quill down approximately 4 inches and insert a scriber in the hole provided in the quill guard. This hole is located at the R.H. side of the stop slot in the head body, at the bottom of the quill guard No. 52-11870. Whilst applying upward pressure, move the hole to the L.H. side of the stop slot.
4. Securely holding the end of the quill, feed down using the hand feed lever until the pinion gear dis-engages the quill rack. The quill should now be resting on the wooden table protector.
5. To relieve the spring force on the hand feed lever, return to the "up" position (no force if spring is broken), approximately 3 turns.
6. Drive out spring pin Det. 94, remove hex, adaptor and set screw Det. 128. Screw out bush part No. 52-12210. The head flange worm No. 52-12038 can now be removed by revolving A.C.W.
7. Remove head flange worm gear No. 52-11876 by unscrewing 3 screws Det. 48. To prevent damage to tapped holes and take the thrust of jack screws, insert two 3/8-16 x 1" long set screws. Jack off flange by using two 7/16 - 14 x 2" long screws.
CAUTION: Care must be taken when finally removing flange as the quill return spring may uncoil rapidly if broken.
8. Remove defective spring No. 52-11958 from hub. **CAUTION:** If spring is not broken, a spring retainer must be used. Tighten spring by turning hand feed lever, in a down feed direction until O.D. of spring is 2.1 dia. and slip on retainer. Slowly release feed handle.

Installing:

1. Insert new spring and retaining ring onto hub No. 52-12187.
2. Tighten up spring by turning hand feed lever. Turning this lever in the down feed direction should increase tension. Remove the retaining ring and slowly unwind the hand feed lever.
3. Push the quill upward into the head body until contact is made with the feed pinion. Turn the hand feed lever in the down feed direction approximately $3\frac{1}{2}$ turns and then push the quill upward until engagement of the rack and pinion is made. Feed quill upward approximately 2" and tighten quill lock.
4. Replace stop block.
5. Re-position quill guard, part No. 52-11870, by inserting scribe into the small hole provided (the hole should be at the L.H. side of the stop slot from disassembly operation 3).
Apply a light downward pressure and move to the R.H. side approximately 1". If the guard is positioned correctly, it will slide down over the quill when further pressure is applied.
6. Re-position stop screw and tighten set screw Det. 124.
7. Replace head flange worm and worm gear. When tightening screw Det. 128 align with slot in bush part No. 52-12210.

Removing Spindle-Quill Sub-Assembly and Replacing Quill Guard:

Ref. page 18 and page 20

REMOVING:

1. Remove draw bar from head.
2. Follow instructions for removing the quill return spring up to and including item No. 5.
3. Whilst holding the quill in one hand, lower the knee until the quill is clear of the head body and then remove from the machine.
4. Remove guard by pulling out through the bottom of the head body.

INSTALLING:

1. Check that spring part No. 52-11877 is bent so that it contacts the top of the quill on both sides of the $\frac{1}{4}$ " slot and does not project beyond the O.D. of the quill.
2. Insert new guard, tab at the bottom and small hole in line with the L.H. side of the slot in the body. The guard should be a good fit in the upper part of the bore. If necessary, bend guard to size its dia. (3 $\frac{11}{16}$) $\frac{1}{4}$ " larger than the quill dia.
3. Check that quill lock pads do not project into bore of head body. Insert quill into body. It will be necessary to align the spindle spline with the drive sleeve by rotating the spindle, while inserting the quill.
4. Follow instruction for "Installing" the quill return spring, items No. 3, 4, 5 and 6.

Replacing R8 Drive Key:

Ref. page 18

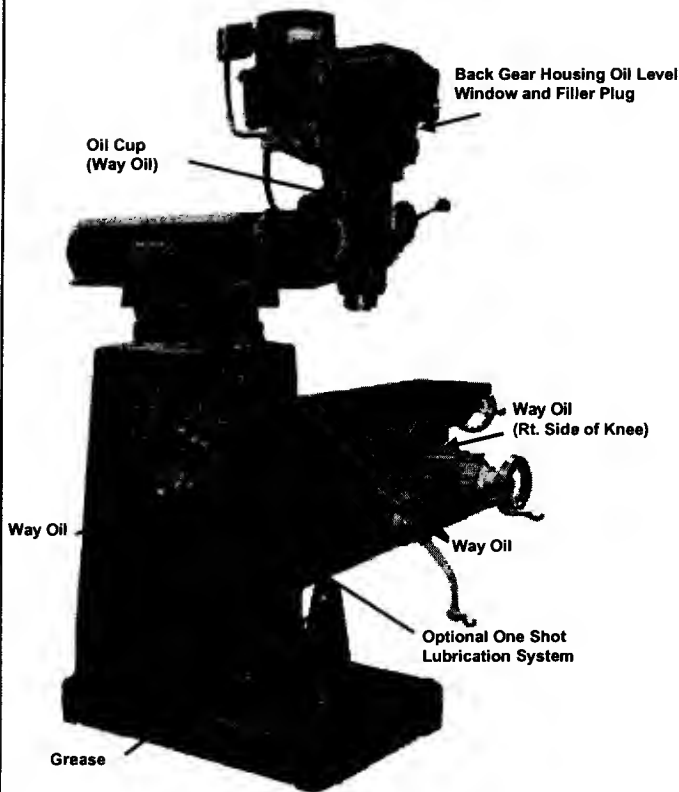
1. Remove dry seal plug from back of quill body and rotate spindle to align drive key with access hole.
2. Insert $\frac{3}{16}$ Allen Key into access hole and screw drive key through into bore of spindle.
3. Insert new drive key into bore of spindle and align with tapped hole. To do this it is convenient to first mount the drive key into a tapped hole in a strip of metal approx. $\frac{1}{8}$ " x $\frac{1}{2}$ " x 4" lg. Screw back the key until it projects into the bore $\frac{3}{16}$ " with the sides of the key in the axial plane.
4. Check for correct position by inserting an adaptor, and then replace the dry seal plug in the quill. Check that the plug does not project above the surface of the quill.

Feed Rate Table Power Feed:

Feed rate of Motor & Control Assembly is adjusted at Factory and should not be tampered with. If problems are encountered contact your 602 Mill Distributor.

Lubrication

EX-CELL-O RAM TURRET MILLING MACHINE – STYLE 602



The machine must be lubricated before it is started. The use of proper lubricant at the designated places is necessary to obtain the best operating performance and to insure the maximum service life of the machine.

Oil level in back gear housing should be checked daily. Correct oil level is indicated only when spindle is vertical and low speed range is engaged. A.G.M.A. No. 5EP oil.

Oil Fittings should be filled with a way oil 30W several times per day.

The Oil Cup should be filled with way oil 30W daily.

Spindle Bearings are lubricated and sealed for the life of the machine.

MOTORS - The manufacturer's recommendation should be followed.

When the machine is equipped with optional table power feed and right angle attachment the oil level in the gear box should be checked periodically and filled until it flows out of the filling hole, with EP5G

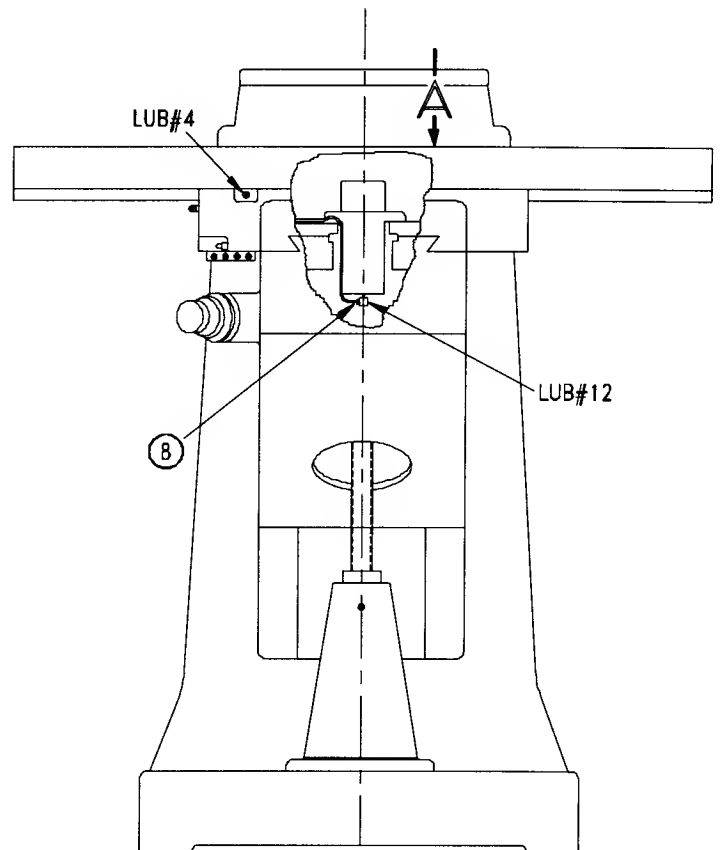
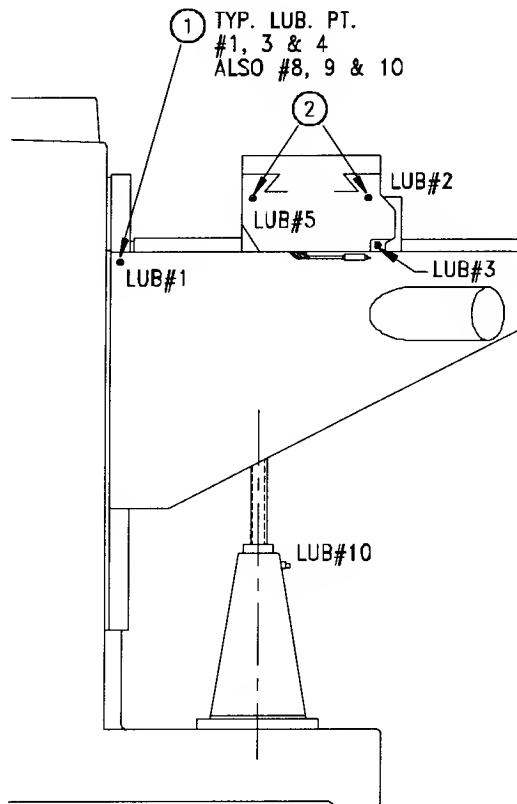
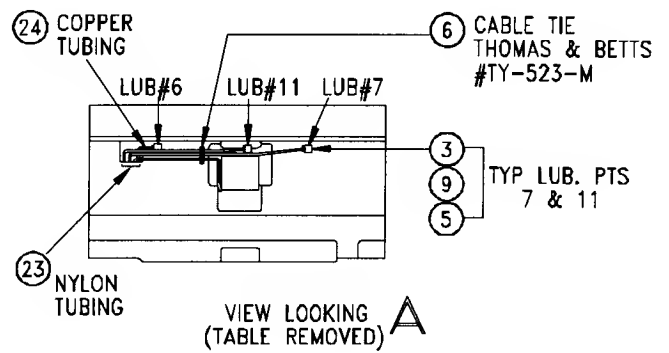
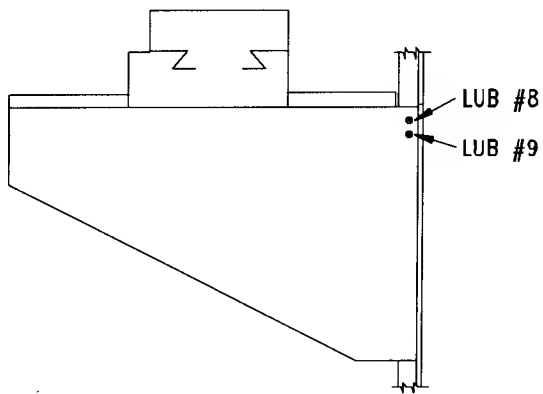
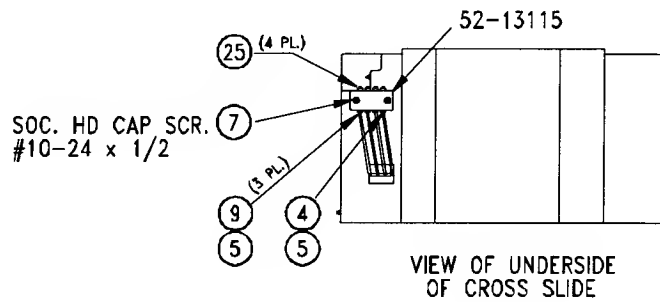
On machines equipped with optional one shot or automatic lubrication system, replenish reservoir daily with way oil 30W.

Discretion in oiling should be employed at all times. Over oiling may result in an undesirable escape of these substances from the machine. If this trouble is experienced cut down on amount of lubricant used or increase period of application accordingly.

Manual Lubrication System

EX-CELL-O RAM TURRET MILLING MACHINE – STYLE 602

No. 52-15028



QUANTITIES ARE PER LINE OR POINT

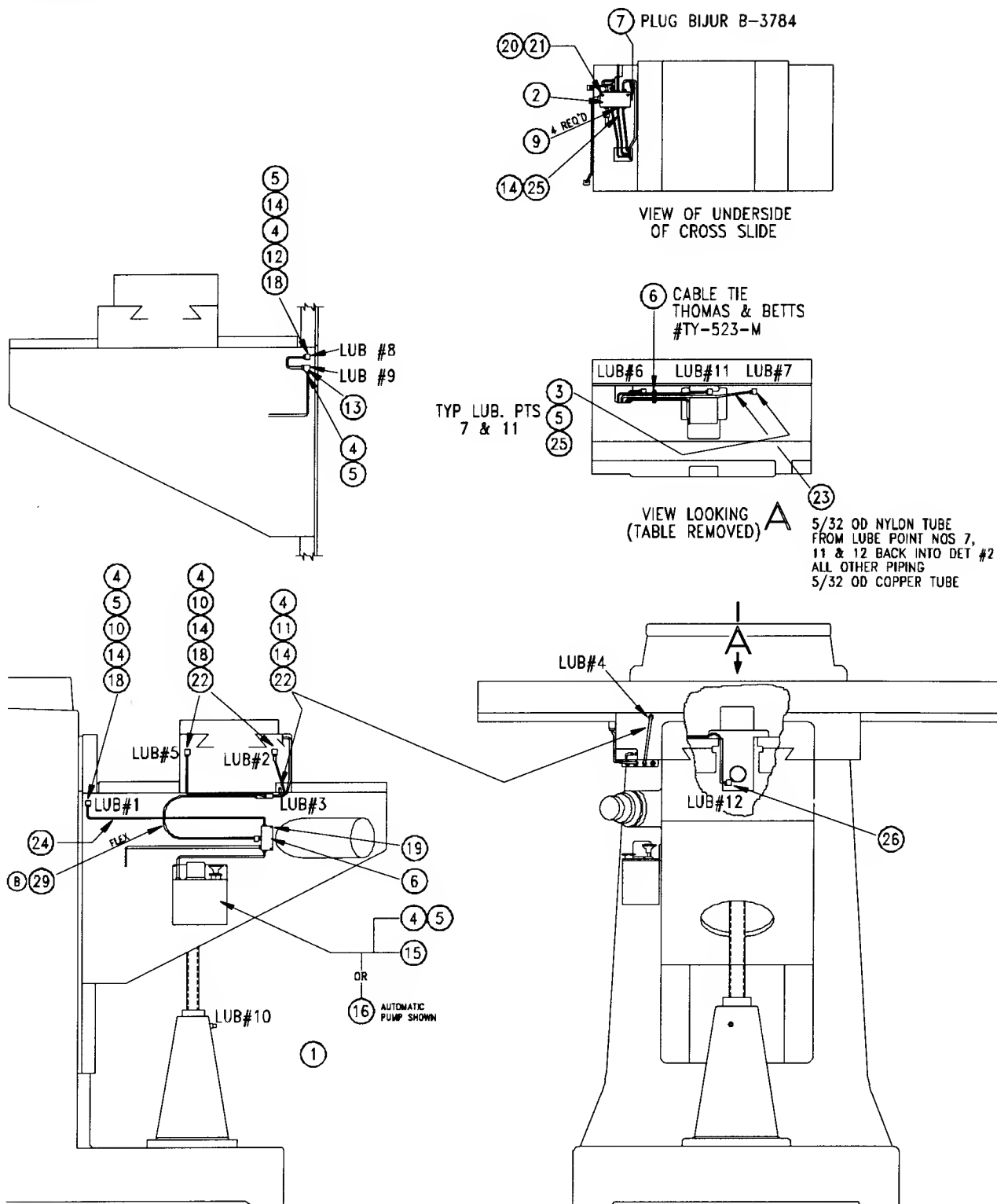
LUBE PT. No.	PART TO BE LUBRICATED	ELBOW		GREASE FITTING		COMPRESSION BUSH No		COMPRESSION SLEEVE No		DRIVE BUSH	
		XLO #	BIJUR #	XLO #	ALEMITE #	XLO #	BIJUR #	XLO #	BIJUR #	XLO #	BIJUR #
		QUAN		QUAN		QUAN		QUAN		QUAN	
1	COLUMN WAY & DOVE TAIL			① 1	1610-BL						
2	TABLE WAY			② 1	1613-B (90°)						
3	CROSS SLIDE GIB			① 1	1610-B						
4	TABLE GIB			① 1	1610-B						
5	TABLE WAY & DOVE TAIL			② 1	1613-B (90°)						
6	CROSS SLIDE WAY	③ 1	A-3080	②⑤ 1	1641-B	⑤ 2	B-1371	④ 2	B-1061		
7	CROSS SLIDE WAY	③ 1	A-3080	②⑤ 1	1641-B	⑤ 2	B-1371	⑨ 2	B-8272		
8	COLUMN WAY			① 1	1610-B						
9	COLUMN GIB			① 1	1610-B						
10	KNEE L/SCR			① 1	1610-B						
11	TABLE L/SCR	3 1	A-3080	②⑤ 1	1641-B	⑤ 2	B-3783	⑨ 2	B-8272		
12	CROSS SLIDE L/SCR	3 1	A-3080	②⑤ 1	1641-B	⑤ 2	B-3783	⑨ 1	B-8272	⑧ 1	B-4067

**XLO DETAIL NUMBERS ARE SHOWN
(EXAMPLE – XLO No 52-15028 ①)**

One Shot or Automatic Lubrication System

EX-CELL-O RAM TURRET MILLING MACHINE – STYLE 602

No. 52-15168



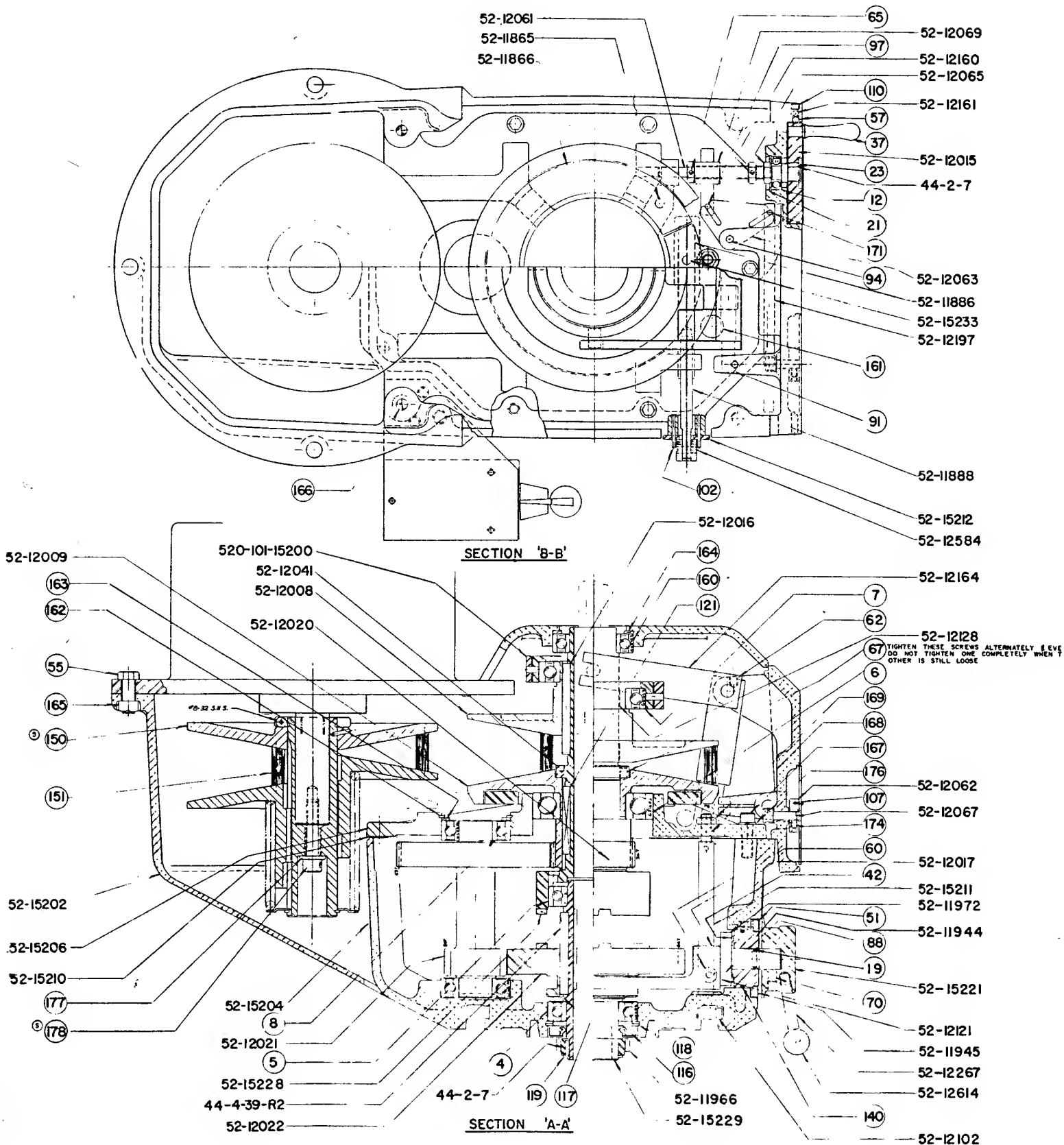
**QUANTITIES ARE TOTAL NUMBER OF FITTINGS
FOR FEEDER LINE FROM SOURCE TO POINT INDICATED**

LUBE LINE & PT. No.	TO AREA OR FITTING	FROM SOURCE	METER) - TYPE UNIT) - No		COMPRESSION NUT No		COMPRESSION BUSH No		COMPRESSION SLEEVE No		ELBOW		DRIVE BUSH	
			XLO #	BIJUR #	XLO #	BIJUR #	XLO #	BIJUR #	XLO #	BIJUR #	XLO #	BIJUR #	XLO #	BIJUR #
			QUAN		QUAN		QUAN		QUAN		QUAN		QUAN	
1	COLUMN WAY & DOVE TAIL	BIJUR JUNC. BAR # B-3262 XLO # (8)	(10) 1	FSA-2 B-1085	(14) 1	B-1095	(5) 1	B-1371	(4) 2	B-1061	(18) 1	A-2768		
2	TABLE WAY	BIJUR JUNC. BAR # B-3787 XLO # (2)	(10) 1	FSA-2 B-1085	(14) 1	B-1095	(22) 1	B-3783	(4) 2	B-1061	(18) 1	A-2768		
3	CROSS SLIDE GIB	"	(11) 1	FSA-0 B-1083	(14) 1	B-1095	(22) 1	B-3783	(4) 2	B-1061				
4	TABLE GIB	"	(11) 1	FSA-0 B-1083	(14) 1	B-1095	(22) 1	B-3783	(4) 2	B-1061				
5	TABLE WAY & DOVE TAIL	"	(10) 1	FSA-2 B-1085	(14) 1	B-1095	(22) 1	B-3783	(4) 2	B-1061	(18) 1	A-2768		
6	CROSS SLIDE WAY	"	(9) 1	FJB-2 B-2497	(14) 1	B-1095	(5) 1	B-1371	(25) 2	B-8272	(3) 1	A-3080		
7	CROSS SLIDE WAY	"	(9) 1	FJB-2 B-2497	(14) 1	B-1095	(5) 1	B-1371	(4) 2	B-1061	(3) 1	A-3080		
8	COLUMN WAY	BIJUR METER # FTDO-B-1106 XLO # (13)	(12) 1	FSA-1 B-1084	(14) 1	B-1095	(5) 1	B-1371	(4) 2	B-1061	(18) 1	A-2768		
9	COLUMN GIB	BIJUR JUNC. BAR # B-3262 XLO # (8)	(13) 1	FTD-0 B-1106			(5) 2	B-1371	(4) 2	B-1061				
10	KNEE L/SCR	(1) 1	ALEMITE GREASE FITTING # 1610-B											
11	TABLE L/SCR	BIJUR JUNC. BAR # B-3787 XLO # (2)	(9) 1	FJB-2 B-2497	(14) 1	B-1095	(5) 1	B-1371	(25) 2	B-8272	(3) 1	A-3080	(26) 1	B-4067
12	CROSS SLIDE L/SCR	"	(9) 1	FJB-2 B-2497	(14) 1	B-1095			(25) 1	B-8272				
	BIJUR JUNC. BAR #B-3262 XLO # (8)	MANUAL PUMP BIJUR # L5R/D-2684 - (XLO # (15)) OR AUTOMATIC PUMP BIJUR # TMI/C-2803 - (XLO # (16))					(5) 2	B-1371	(4) 2	B-1061				
	BIJUR JUNC. BAR # B-3787 XLO # (2)	BIJUR JUNC. BAR FLEXIBLE HOSE # B-3262 BIJUR # B-4589 XLO # (8) (XLO # (17))					5 (2)	B-1371	4 (2)	B-1061				

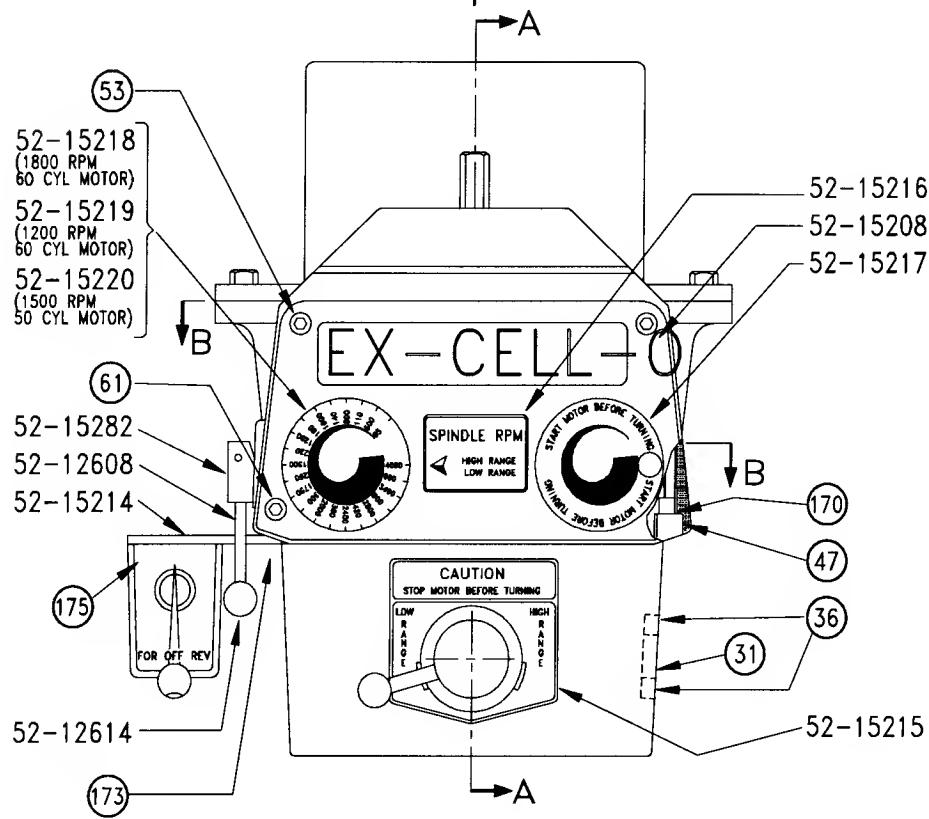
**XLO DETAIL NUMBERS ARE SHOWN ()
(EXAMPLE - XLO No 52-15168-(1))**

Head Drive Assembly

No. 52-15200



Part #	Qty.	Description	Part #	Qty.	Description
52-11865	1	Brake Pin	52-12160	1	Stop Nut
52-11866	1	Brake Band	52-12161	1	Spring
52-11886	1	Brake Bar	52-12164	1	Vari-Speed Fork
52-11888	1	Brake Lock Stud	52-12197	1	Shaft
52-11944	1	Eccentric Bushing	52-12267	1	Lever
52-11945	1	Clamp Ring	52-12582	1	Brake Cam
52-11966	1	Feed Engaging Gear	52-12584	1	Cam Screw
52-11972	1	Back Gear Fork Shaft	52-12608	1	Lever
52-12008	1	Sliding Vari-Disk	52-12614	2	3/4" Ball
52-12009	1	Brg. Vari-Disk	52-15202	1	Belt Housing
52-12015	1	Speed Handle Wheel	52-15204	1	Gear Housing
52-12016	1	Key	52-15206	1	Bearing Housing
52-12017	1	Shift Fork	52-15208	1	Speed Dial Housing
52-12020	1	Spindle Gear	52-15210	1	Gasket
52-12021	1	Reduction Gear	52-15211	1	Guide Pin
52-12022	1	Engaging Gear	52-15212	1	Brake Plate
52-12041	1	Lock Nut	52-15214	1	Switch Bracket
52-12061	1	Vari-Speed Shaft	52-15215	1	Speed Range Plate
52-12062	1	Dial Indicator Plate	52-15216	1	Spindle R.P.M. Plate
52-12063	1	Lever	52-15217	1	Speed Selector Plate
52-12065	1	Nut	52-15218	1	Spindle R.P.M. Plate
52-12067	1	Pinion	52-15221	1	Speed Range Knob
52-12069	1	Fork Nut	52-15228	1	Drive Shaft
52-12102	4	T Nut	52-15229	1	Spindle Drive Sleeve
52-12121	1	Sliding Block	52-15233	1	Brake Pin
52-12128	2	Vari-Disc Bushing	520-101-15200	1	Gimbal Ring Assembly



Head Drive Assembly

No. 52-15200

Det. No.	Qty.	Description
4	1	Bearing 6008Z
5	1	Bearing 6008
6	1	Bearing 6210RS
7	1	Bearing 60102Z
8	2	Bearing 6205RS
12	1	Bearing 60002Z
19	1	O-Ring Precision Rubber #902-9
21	1	Retaining Ring #5000-102 Truarc
23	1	Retaining Ring #5100-50 Truarc
31	1	Oil Level
36	1	$\frac{3}{8}$ Hex Soc. Pipe Plug Levl-Seal
37	1	Handle #H3303 Balcrank
47	4	Soc. Hd. Screw $\frac{3}{8}$ -16 x 1 $\frac{1}{4}$
51	3	Soc. Hd. Screw #8-32 x $\frac{3}{8}$
53	4	Soc. Hd. Screw $\frac{1}{4}$ -20 x 1
55	4	Hex. Hd. Screw $\frac{3}{8}$ -16 x 1
57	2	$\frac{3}{16}$ Dia. Steel Ball
60	3	Button Hd. Soc. Screw $\frac{1}{4}$ -20 x $\frac{3}{8}$
61	2	Soc. Hd. Screw $\frac{1}{4}$ -20 x $\frac{3}{4}$
62	3	Cone Soc. Set Screw $\frac{1}{4}$ -20 x $\frac{3}{8}$
65	2	Soc. Set Scr. #4-48 x $\frac{1}{8}$ K.P.
66	2	Cup Soc. Set Screw #8-32 x $\frac{5}{16}$
67	1	Flat Soc. Set Screw #10-32 x $\frac{3}{8}$
70	1	Half Dog. Soc. Set Screw $\frac{1}{4}$ -20 x $\frac{1}{2}$
88	1	Dowl Pin $\frac{3}{16}$ D x $\frac{1}{2}$
91	2	Dowl Pin $\frac{3}{8}$ D x 1 $\frac{1}{4}$
94	4	Spring Pin $\frac{3}{16}$ x $\frac{3}{4}$
97	3	Spring Pin $\frac{1}{8}$ D x $\frac{1}{2}$
102	1	Spring Pin $\frac{1}{8}$ D x 1" Lg.
107	10	Drive Scr. Type 'U' #0 x $\frac{1}{4}$
110	2	Soc. Set Screw $\frac{1}{4}$ -20 x $\frac{1}{4}$
116	1	Oil Seal Weston #26915638 R4
117	1	Spir Olox Ring #RS-175
118	1	Spir Olox Ring RRT-268
119	1	Truarc Ring #5100-150
121	1	Key 44-4-32-R2
122	1	Key 44-4-39-R2
123	1	Key 44-2-7
140	1	'O' Ring Precision Rubber #914-28
150	1	Motor Pulley
151	1	Vari Speed Belt
160	1	Bearing 6007-2Z
161	1	Air Vent
162	1	Retaining Ring N5000-206
163	1	Wave Washer
164	1	Wave Washer
165	3	Square Nut $\frac{3}{8}$ -16
166	2	Pull Dowl $\frac{5}{16}$ x 1 $\frac{3}{4}$
167	7	Soc. Hd. Cap Scr. $\frac{5}{16}$ -18 x 1
168	1	Soc. Set Scr. $\frac{5}{16}$ -18 x 1 CNP
169	1	Jam Nut $\frac{5}{16}$ -18
170	4	Shnorr Washer VS10
171	1	Spring Pin $\frac{1}{8}$ x $\frac{5}{16}$
173	2	Soc. Hd. Cap Scr. $\frac{5}{16}$ -18 x $\frac{3}{4}$
174	1	Soc. Set Scr. #10-32 x $\frac{1}{4}$ F.P.
175	3	Mach. Screw 10-24 x $\frac{1}{4}$
176	7	Shnorr Washer VS8
177	1	Shnorr Washer $\frac{3}{8}$
178	1	Soc. Hd. Screw $\frac{3}{8}$ -16 x 1 $\frac{3}{4}$

Head Body Assembly

No. 52-15190

Part No.	Qty	Description
52-11870	1	Guard
52-11872	1	Stop Block
52-11876	1	Head Flange Gear
52-11877	1	Spring
52-11909	1	Quill
52-11958	1	Spring
52-11974	1	Head Flange Scale
52-11978	1	Handwheel
52-11979	1	Worm Shaft
52-11989	1	Gasket
52-11990	1	Bearing Retainer
52-11992	1	Spacer
52-11994	1	Gear Cover
52-12024	1	Feed Gear
52-12025	1	Feed Gear
52-12026	1	Feed Gear
52-12027	1	Feed Gear
52-12028	1	Feed Gear
52-12029	1	Feed Gear
52-12030	1	Feed Gear
52-12031	1	Feed Gear
52-12032	1	Feed Gear
52-12034	1	Worm
52-12036	1	Feed Worm
52-12037	1	Feed Worm Gear
52-12038	1	Head Flange Worm
52-12051	1	Adapter
52-12052	1	Shift Rod
52-12053	1	Worm Gear Shaft
52-12054	1	Idler Shaft
52-12055	1	Reverse Shaft
52-12080	1	Clutch Spacer
52-12085	1	Hand Feed Lever
52-12088	1	Feed Change Knob
52-12089	1	Quill Lock
52-12090	1	Quill Lock Cam
52-12091	1	Quill Lock Cam
52-12100	1	Shifting Fork
52-12126	1	Head Tilting Scale
52-12134	1	Feed Reverse Plate
52-12135	1	Plug
52-12137	1	Feed Change Gear
52-12152	1	Clutch Ring
52-12153	1	Clutch Ring Spacer
52-12154	1	Feed Knob
52-12155	1	Clutch Engaging Knob
52-12161	1	Spring
52-12157	1	Washer
52-12165	1	Feed Reverse Knob
52-12172	1	Clamp Flange
52-12173	1	Worm Gear
52-12174	1	Clutch Cone
52-12175	1	Pinion Shaft
52-12186	1	Nut
52-12187	1	Spring Collar
52-12198	1	Gear Shift Rod

Part No.	Qty.	Description
52-12199	1	Gear
52-12210	1	Bush
52-12267	1	Lock Lever
52-12282	1	$\frac{5}{16}$ " Wrench Ass'y.
52-12608	1	Lever
52-12613	1	$1\frac{5}{8}$ Dia. Plastic Ball
52-12614	2	$\frac{3}{4}$ Dia. Plastic Ball
52-12894	1	Wrench
52-16114	1	Head Flange Gear
52-16115	1	Head Flange
44-2-7	1	Key
44-2-10	1	Key
44-2-12	1	Key
44-2-30-R2	1	Key
520-231-	1	R8 Draw Bar
520-233-	1	#40 MMT Draw Bar

PARTS FOR INCH HEAD

Part No.	Qty	Description
52-11871	1	Quill Scale
52-11873	1	Stop Screw
52-11874	1	Stop Dial
52-11875	1	Head Body
52-12603	1	Dial Lock Nut
52-12133	1	Spindle Feed Plate

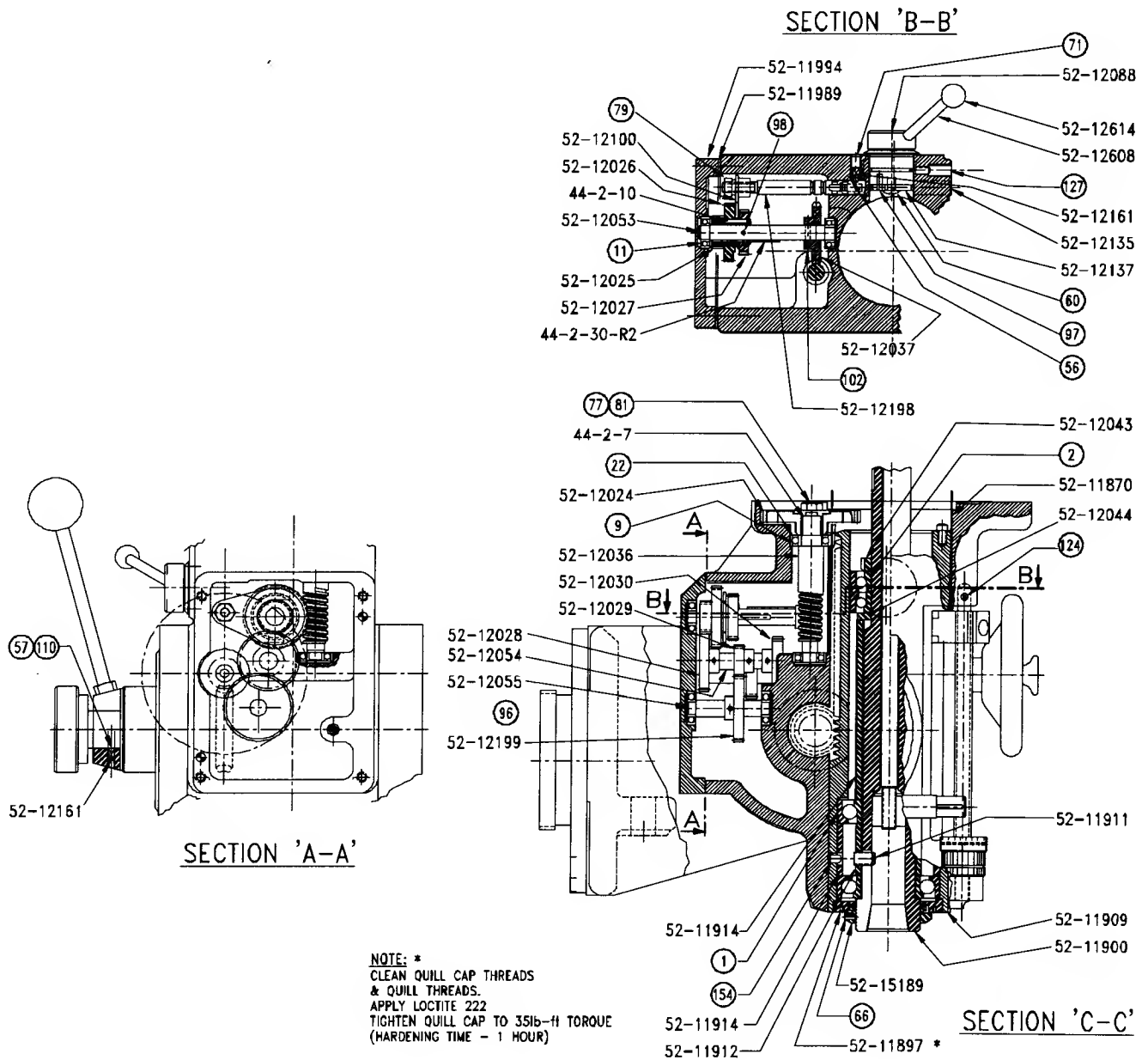
PARTS FOR METRIC HEAD

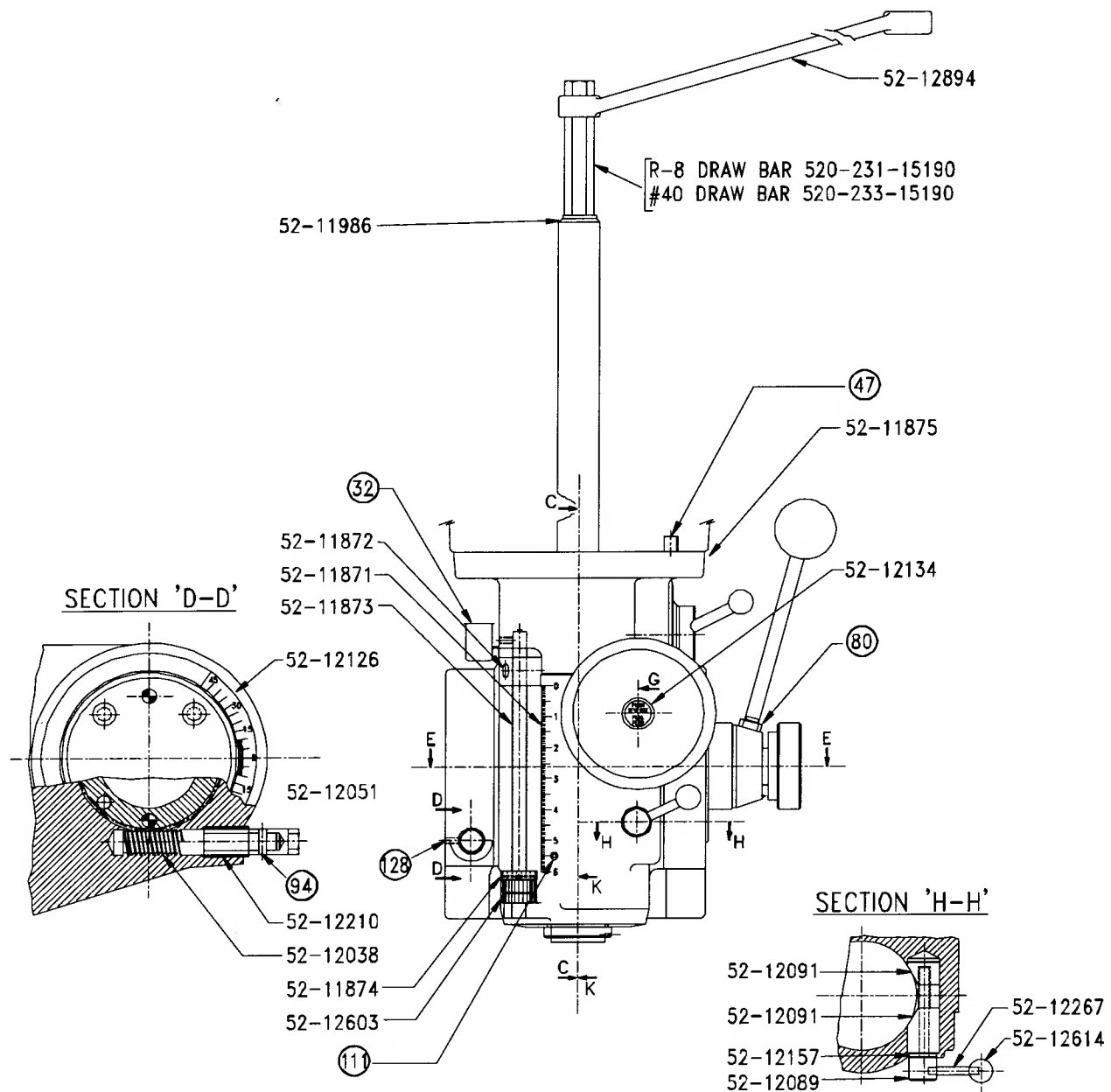
52-13568	1	Stop Dial
52-13569	1	Dial Lock Nut
52-13570	1	Stop Screw
52-13571	1	Quill Scale
52-13572	1	Head Body
52-13573	1	Spindle Feed Plate

Det. No.	Qty.	Description
9	1	Bearing 6002RS
10	2	Bearing 6001
11	7	Bearing 6000
14	1	Thrust Bearing 51101
22	1	Retaining Ring
27	1	Retaining Ring
32	1	Oil Cup
33	6	Clutch Spring
42	3	Spring Washer #7015-A
45	3	S.H.S. $\frac{3}{8}$ -16 x 2"
46	3	S.H.S. $\frac{3}{8}$ -16 x $1\frac{1}{2}$ "
47	4	S.H.S. $\frac{3}{8}$ -16 x 1"
50	3	S.H.S. $\frac{1}{4}$ -20 x $\frac{1}{2}$ "
53	4	S.H.S. $\frac{1}{4}$ -20 x 1"
56	1	$\frac{5}{32}$ Dia. Steel Ball
60	1	B.H.S. $\frac{1}{4}$ -20 x $\frac{3}{8}$
62	2	S.S.S. $\frac{1}{4}$ -20 x $\frac{3}{8}$ " CN. PT.
66	2	S.S.S. 8-32 x $\frac{5}{16}$ "
71	1	S.S.S. $\frac{5}{16}$ "-18 x $\frac{3}{8}$ F.P.
75	1	Woodruff Key #406
77	1	Jam Nut $\frac{3}{8}$ -24
79	1	Jam Nut $\frac{5}{16}$ -24
80	1	Hex Nut $\frac{7}{16}$ -20
81	1	Washer S.A.E.- $\frac{3}{8}$ Bolt
87	1	Dowel Pin $\frac{3}{16}$ x $1\frac{1}{4}$ "
89	1	Spring Pin $\frac{3}{16}$ x $1\frac{3}{4}$ "
90	2	Dowl Pin $\frac{1}{4}$ x $1\frac{1}{4}$ "
94	1	Spring Pin $\frac{3}{16}$ x $\frac{3}{4}$ "
95	1	Spring Pin $\frac{1}{8}$ x $1\frac{1}{8}$ "
96	4	Spring Pin $\frac{1}{8}$ x $\frac{3}{4}$ "
97	1	Spring Pin $\frac{1}{8}$ x $\frac{1}{2}$ "
98	1	Spring Pin $\frac{1}{8}$ x $\frac{3}{8}$ "
100	1	Spring Pin $\frac{3}{8}$ x $\frac{1}{2}$ "
101	2	Washer S.A.E.- $\frac{1}{4}$ Bolt
102	2	Spring Pin $\frac{1}{8}$ x 1"
103	1	Spring Pin $\frac{1}{16}$ x $\frac{7}{8}$ "
105	1	Dowel Pin $\frac{3}{8}$ x $1\frac{3}{4}$ "
106	1	Shoulder S.C.R. $\frac{5}{16}$ - $1\frac{1}{4}$ -20 x $\frac{3}{4}$ "
107	4	Drive S.C.R. 0 x $\frac{1}{4}$ "
110	2	S.S.S. $\frac{1}{4}$ -20 x $\frac{1}{4}$ "
111	2	F.H.S.S. 4-40 x $\frac{1}{4}$ "
125	1	S.H.S. $\frac{5}{16}$ -24 x 1"
127	2	S.S.S. $\frac{1}{4}$ -20 x $\frac{5}{16}$ H.D.P.
128	1	S.S.S. $\frac{1}{4}$ -28 x $\frac{3}{8}$ H.D.Y.N.Y.
135	2	Pull Dowel $\frac{3}{8}$ x 2"
154	1	Dry Seal Plug $\frac{1}{16}$ -27

Head Body Assembly

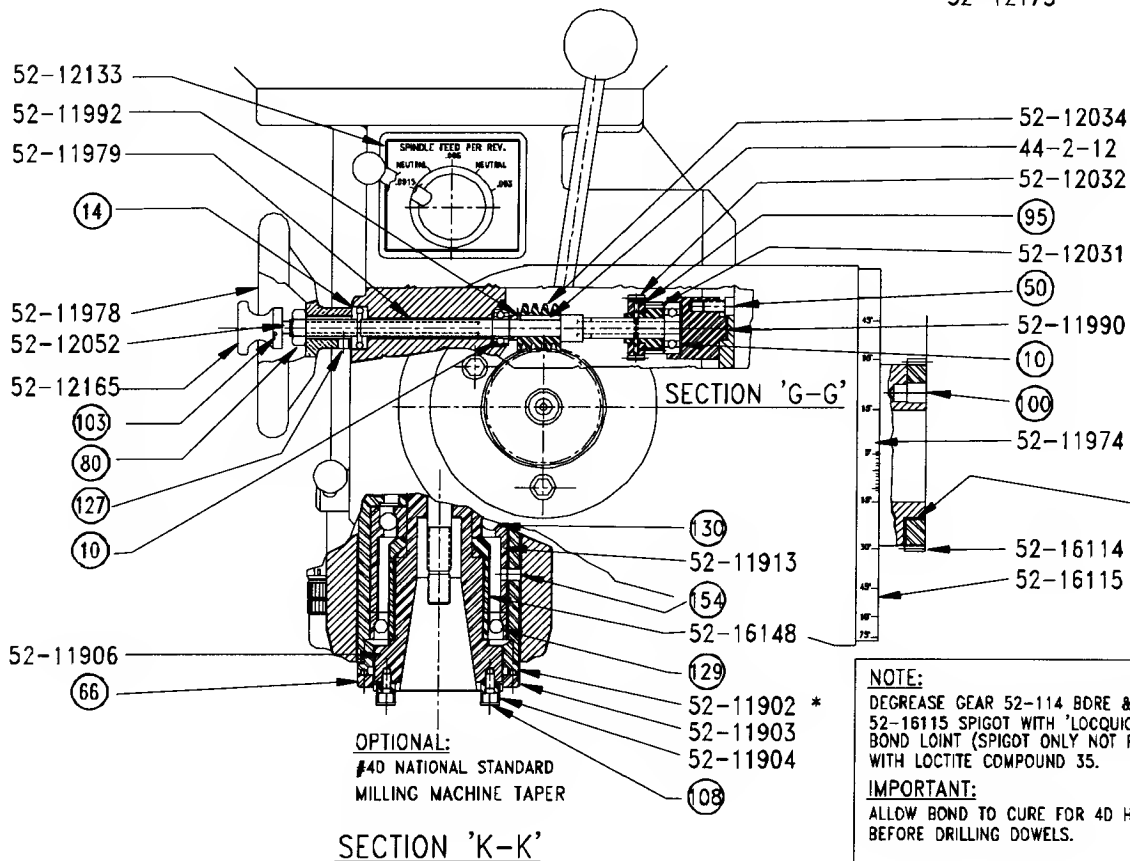
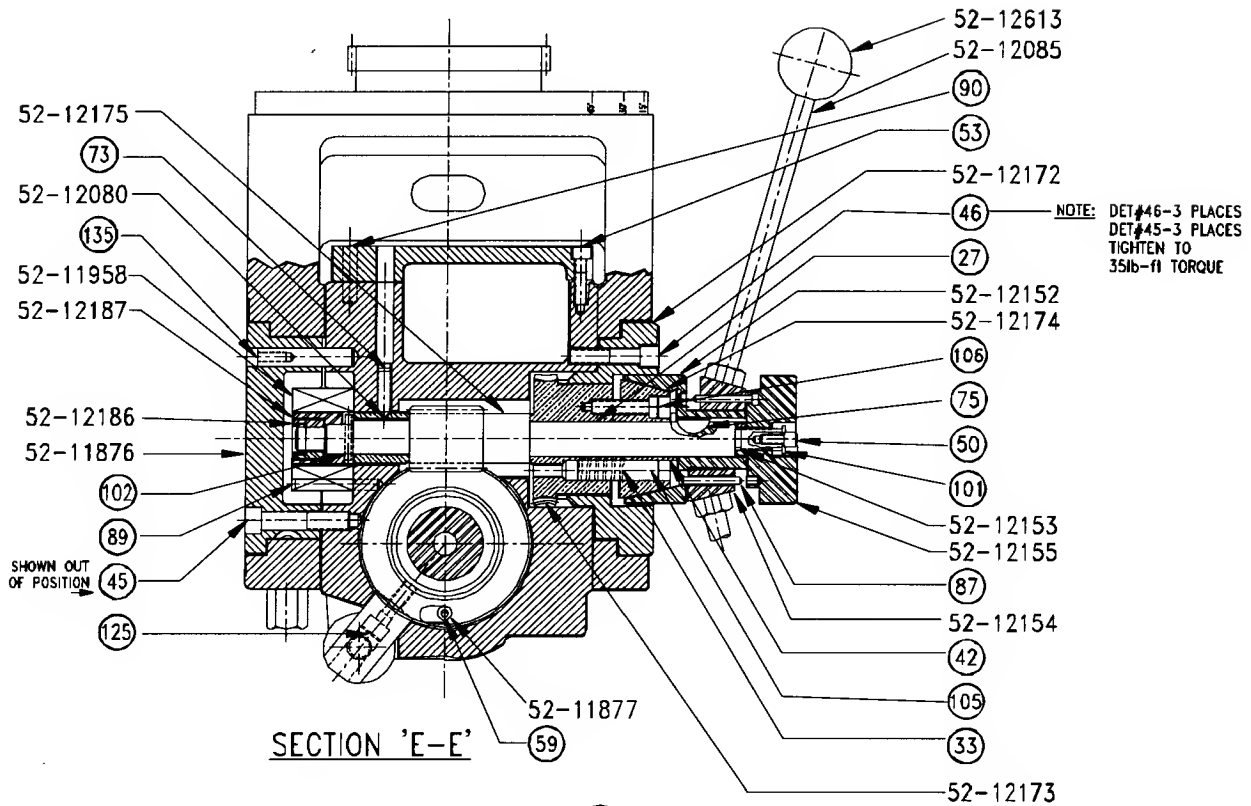
No. 52-15190



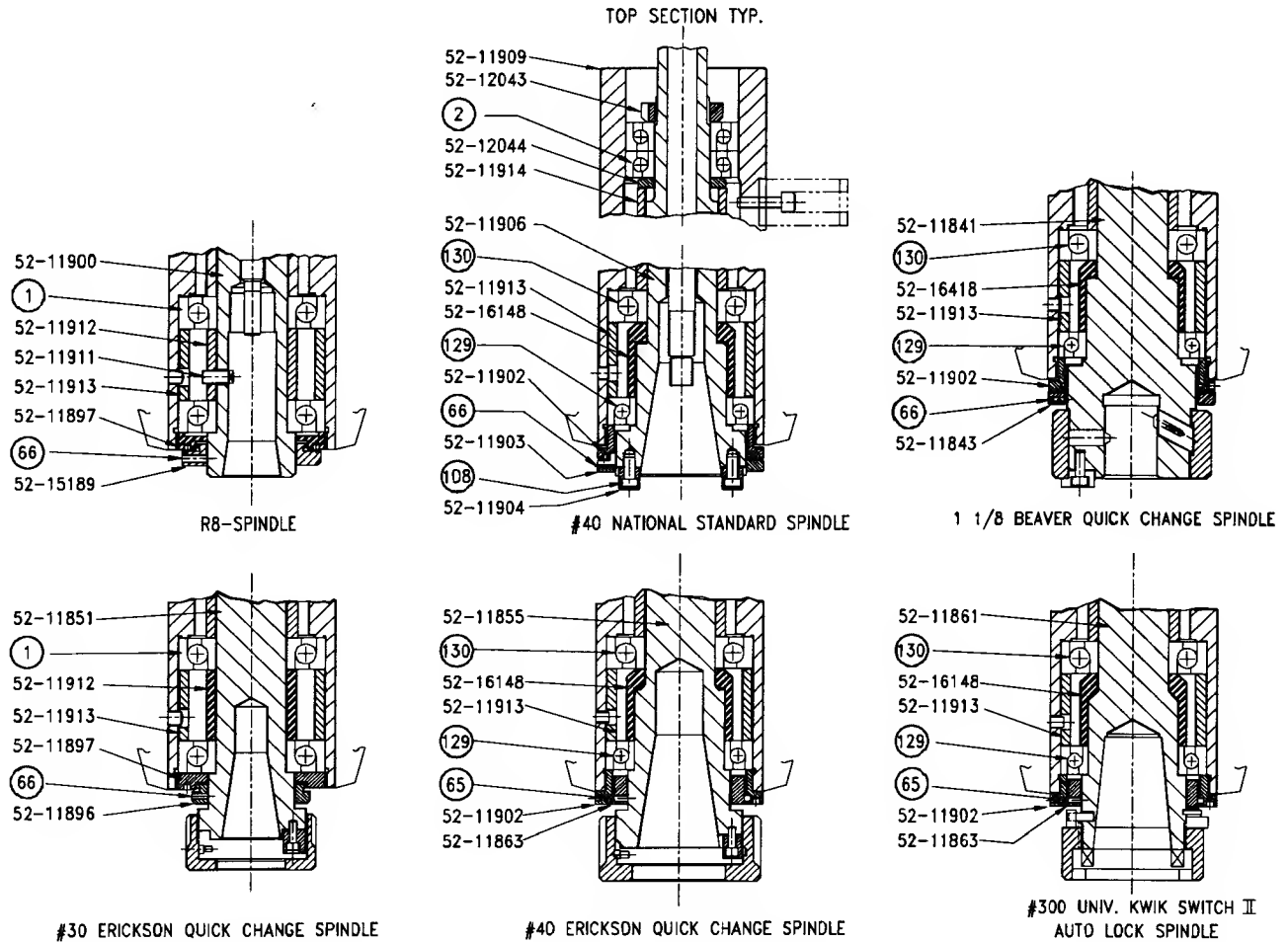


Head Body Assembly

No. 52-15190



Spindle Assembly

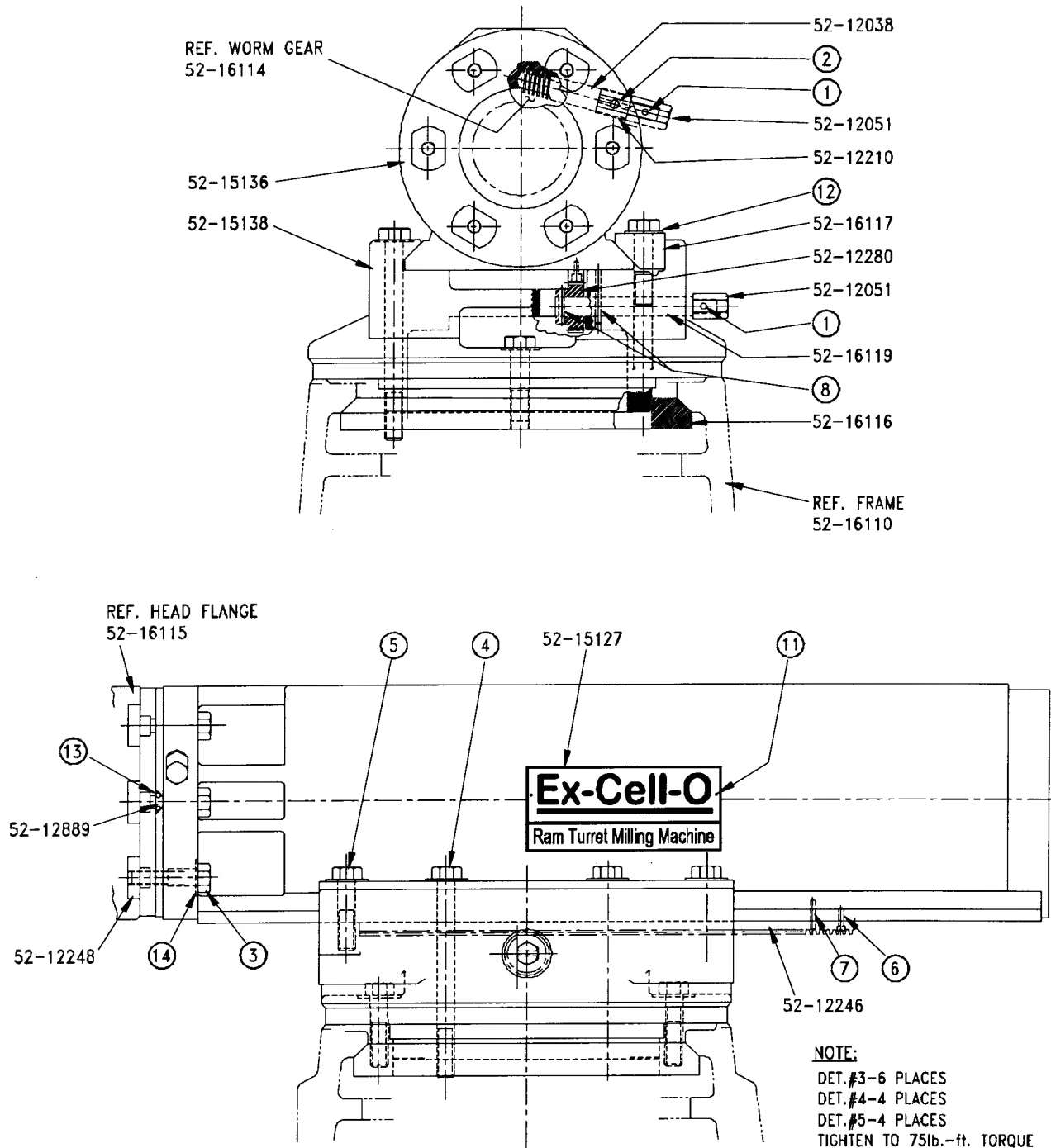


Part	Qty.	Description
52-11841	1	1 1/8 Beaver Spindle
52-11843	1	Seal Ring
52-11851	1	#30 Erickson Spindle
52-11855	1	#40 Erickson Spindle
52-11861	1	#300 Universal Spindle
52-11863	1	Shield
52-11896	1	Seal Ring
52-11897	1	Quill Cap
52-11900	1	R8 Spindle
52-11902	1	Quill Cap
52-11903	1	Seal Ring
52-11904	2	Key
52-11906	1	#40 MMT Spindle
52-11911	1	Key
52-11912	1	Inner Spacer
52-11913	1	Outer Spacer
52-11914	1	Top Spacer
52-12043	1	Lock Nut
52-12044	1	Spacer
52-15189	1	Seal Ring
52-16148	1	Spacer

Det. No.	Qty.	Description
65	2	Soc. Set Sc. 4-48 x 1/8
66	2	Soc. Set Sc. 8-32 x 5/16
108	2	Soc. Set Sc. 10-24 x 1/2
BEARINGS FOR:		
- R8 SPINDLE		
- #30 ERICKSON		
1	1 pr.	Bearing 7208 CTC/C78G05
2	1 pr.	Bearing 7206 CTC/C78G05
BEARINGS FOR:		
- #40 MMT		
- #300 UNIVERSAL		
- #40 ERICKSON		
- 1-1/8 BEAVER		
1	1 pr.	Bearing 7206 CTC/C78G05
129	1 pr.	Bearing 7010 CTC/C78G1
130	1 pr.	Bearing 7208 CTC/C78G

Dovetail Ram Assembly

No. 52-15134



Dovetail Ram Assembly

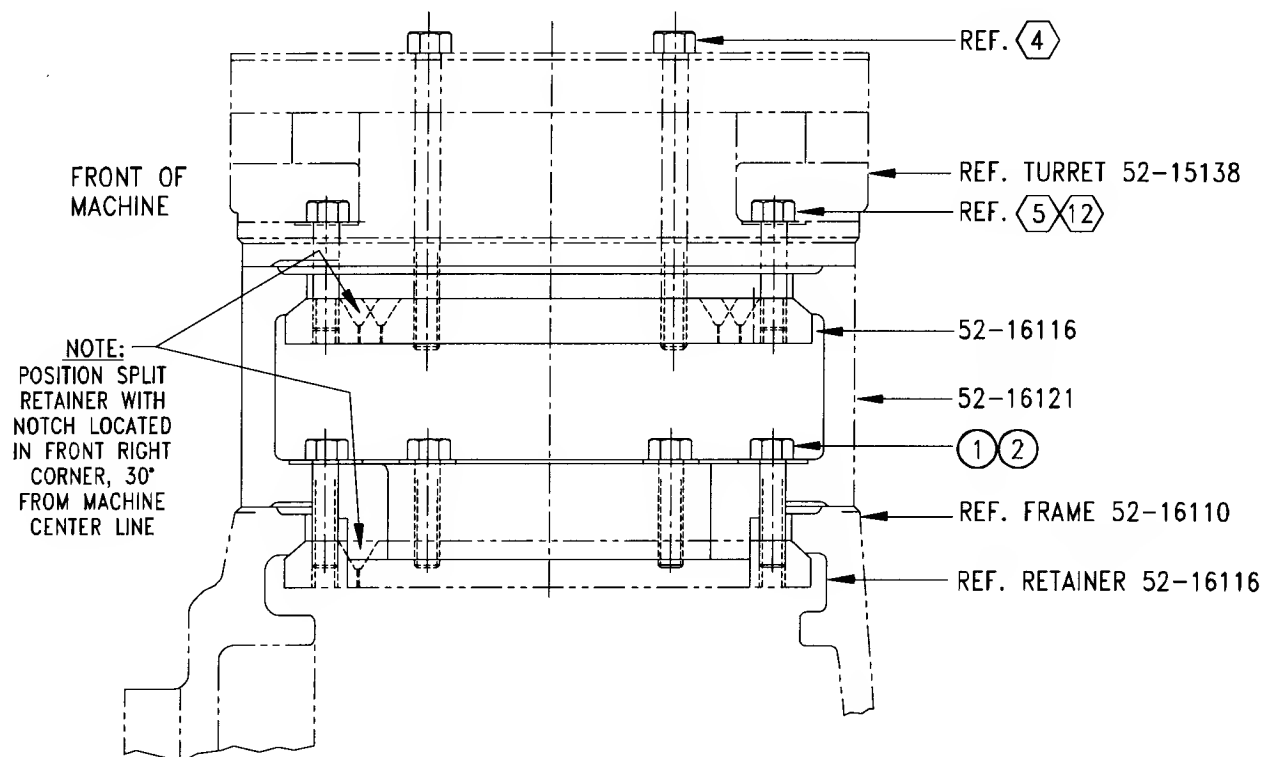
No. 52-15134

Part No.	Qty.	Description
52-12038	1	Head Flange Worm
52-12051	2	Hexagon Adaptor
52-12210	1	Threaded Bushing
52-12246	1	Rack
52-12248	6	Lock Block
52-12280	1	Gear
52-12889	2	Zero Plate
52-15127	1	Name Plate
52-16116	1	Retainer
52-16117	1	Gib
52-16119	1	Ram Gear Shaft
52-15127	2	Name Plate

Det.	Qty.	Description
1	2	Roll Pin $\frac{3}{16}$ Dia x $\frac{3}{4}$
2	1	Soc. Set Scr. $\frac{1}{4}$ -20 x $\frac{5}{16}$
		Half Dog Point - Loc-Wel
3	6	Hex. Hd. Bolt - $\frac{1}{2}$ -13 x $2\frac{1}{4}$ Grade 5
4	4	Hex. Hd. Bolt $\frac{5}{8}$ -11 x 7 Grade 5
5	4	Hex. Hd. Bolt $\frac{5}{8}$ -11 x $2\frac{1}{2}$ Grade 5
6	2	Soc. Hd. Cap Scr. #10-32 x $\frac{5}{8}$
7	1	Spring Pin $\frac{3}{16}$ Dia. X 1
8	2	Spring Pin $\frac{3}{16}$ Dia. X $1\frac{1}{4}$
11	4	Drive Screw - Type 4 x $\frac{5}{16}$ LG.
12	8	SAE Washer $\frac{5}{8}$ Bolt
13	4	Drive Screw - Type O x $\frac{3}{16}$ LG.
14	6	Washer .51 - .94 - .12 HS

5 $\frac{1}{2}$ Riser Assembly and Parts List

No. 52-16120

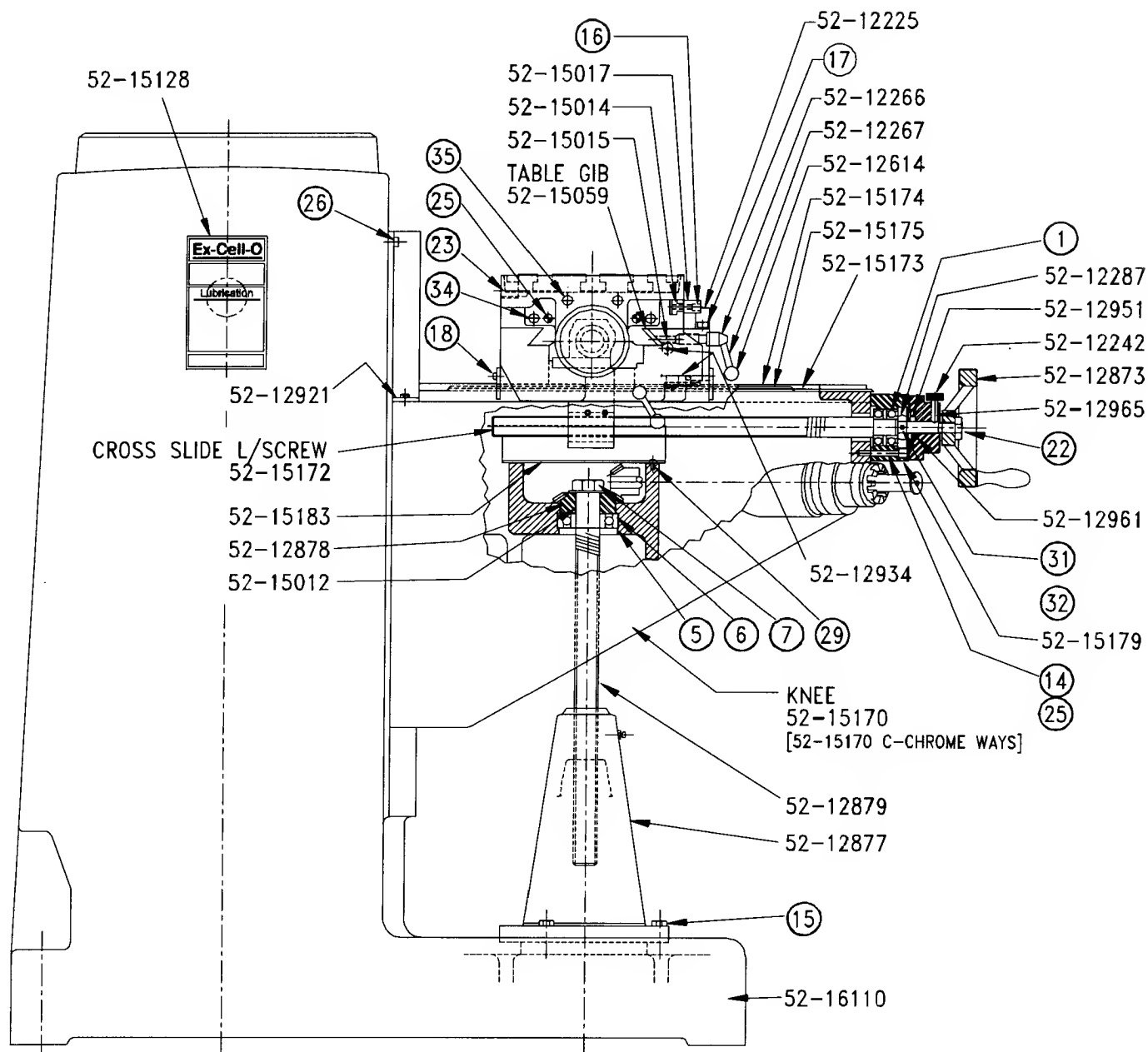


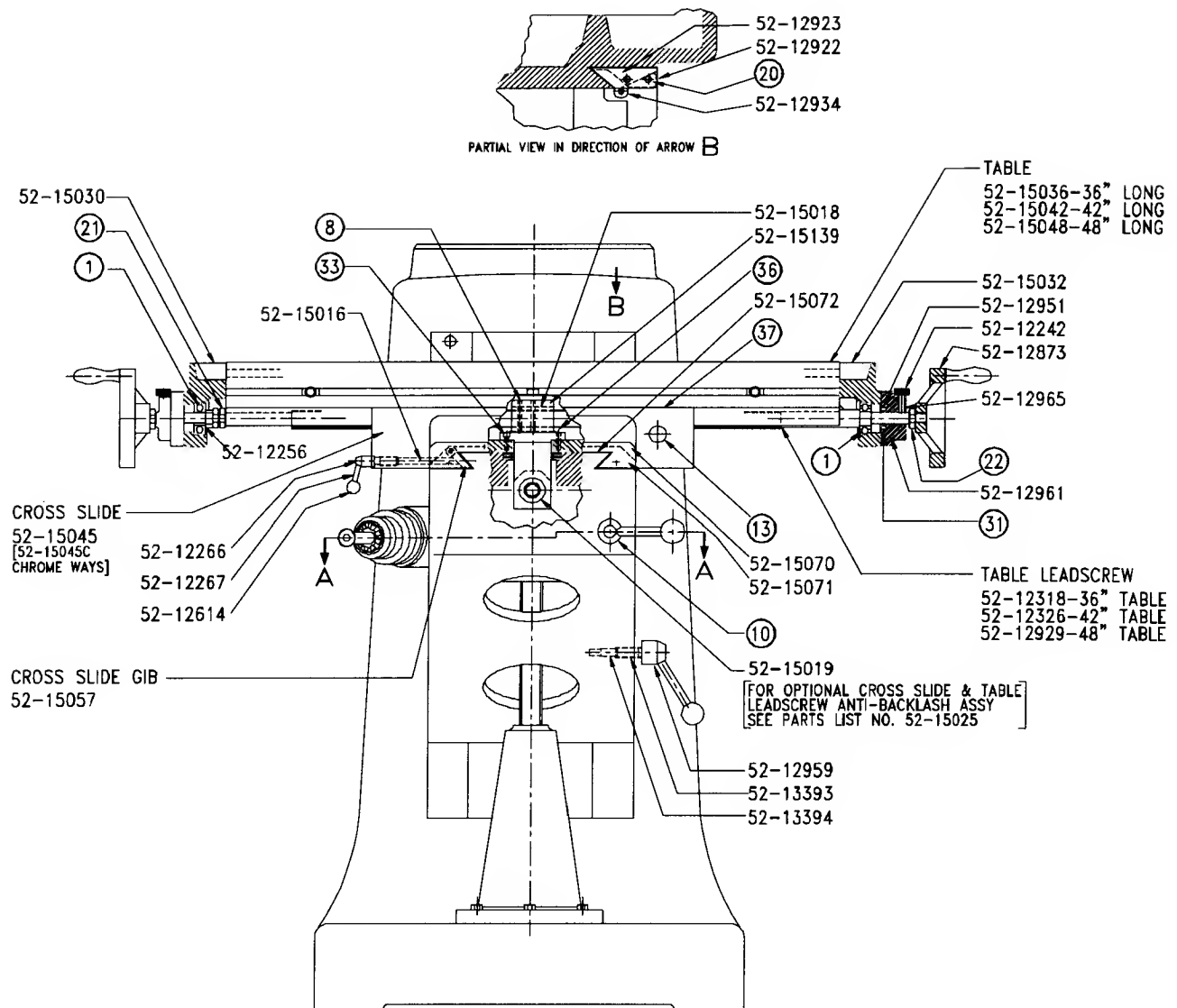
Part No.	Qty	Description
52-16121	1	Riser
52-16116	1	Retainer

Det.	Qty.	Description
1	6	Hex. Hd. Cap. Scr. Grade 5 $\frac{5}{8}$ -11 x $2\frac{1}{2}$ LG.
2	6	$\frac{5}{8}$ Washer

Machine Assembly

No. 52-15020





Machine Assembly

No. 52-15020

Part No.	Qty.	Description
52-12225	1	Table Stop
52-12242	4	Dial Lock Screw
52-12256	1	Bushing
52-12266	2	Lock Screw
52-12267	2	Lock Lever
52-12268	1	Knee Lock Lever
52-12269	1	1 ³ / ₈ Plastic Ball
52-12279	1	Bevel Gear
52-12287	1	Jam Nut
52-12293	1	Collar
52-12318	1	Lead Screw 36"
52-12326	1	Lead Screw 42"
52-12614	2	Plastic Ball
52-12873	1	Handwheel
52-12877	1	Base Nut
52-12878	1	Bevel Gear
52-12879	1	Knee Lead Screw
52-12921	1	Knee Wiper Plate
52-12922	1	Knee Wiper Plate
52-12923	2	Wiper
52-12925	1	Spacer
52-12929	1	Lead Screw 48"
52-12934	6	Thru-Broached S.S.S.
52-12951	3	Spacer
52-12959	1	Gib Lock Nut
52-12961	3	Table & C/S Dials
52-12965	4	Lock Spacer
52-12966	1	Knee Dial Pad
52-12967	1	Knee Dial
52-12968	1	Clutch Plate
52-12992	1	Crank
52-12994	1	Washer
52-13393	1	Lock Lever
52-13394	1	Wedge
52-15012	1	Key
52-15014	2	T-Nut
52-15015	1	Lock Spacer Table
52-15016	1	Lock Spacer C/Slide
52-15017	2	Stop Pad
52-15018	1	Table L/S Nut
52-15019	1	Cross Slide L/S Nut
52-15030	1	Table Dial Pad L.H.
52-15032	1	Table Dial Pad R.H.
52-15036	1	Table 36"
52-15042	1	Table 42"
52-15045	1	Cross Slide
52-15048	1	Table 48"
52-15055	1	Knee Gib
52-15057	1	Cross Slide Gib
52-15059	1	Table Gib
52-15070	2	Cross Slide Wiper Plate
52-15071	4	Cross Slide Wiper
52-15072	2	Cross Slide Wiper
52-15128	1	Data Plate

Part No.	Qty	Description
52-15139	1	L/Scr. Housing
52-15170	1	Knee
52-15172	1	C/S Lead Screw
52-15173	1	Knee Cover Plate
52-15174	1	Knee Cover Plate
52-15175	1	Knee Cover Plate
52-15176	1	Lock Block
52-15177	1	Lock Shaft
52-15178	1	Gib Lock Nut
52-15179	1	Dial Pad
52-15182	1	Knee Gear Shaft
52-15183	1	Gear Cover
52-15184	1	Bushing
52-16110	1	Frame

PARTS FOR 36" LONG TABLE

52-12318	1	Table Leadscrew
52-15036	1	36" Table

PARTS FOR 42" LONG TABLE

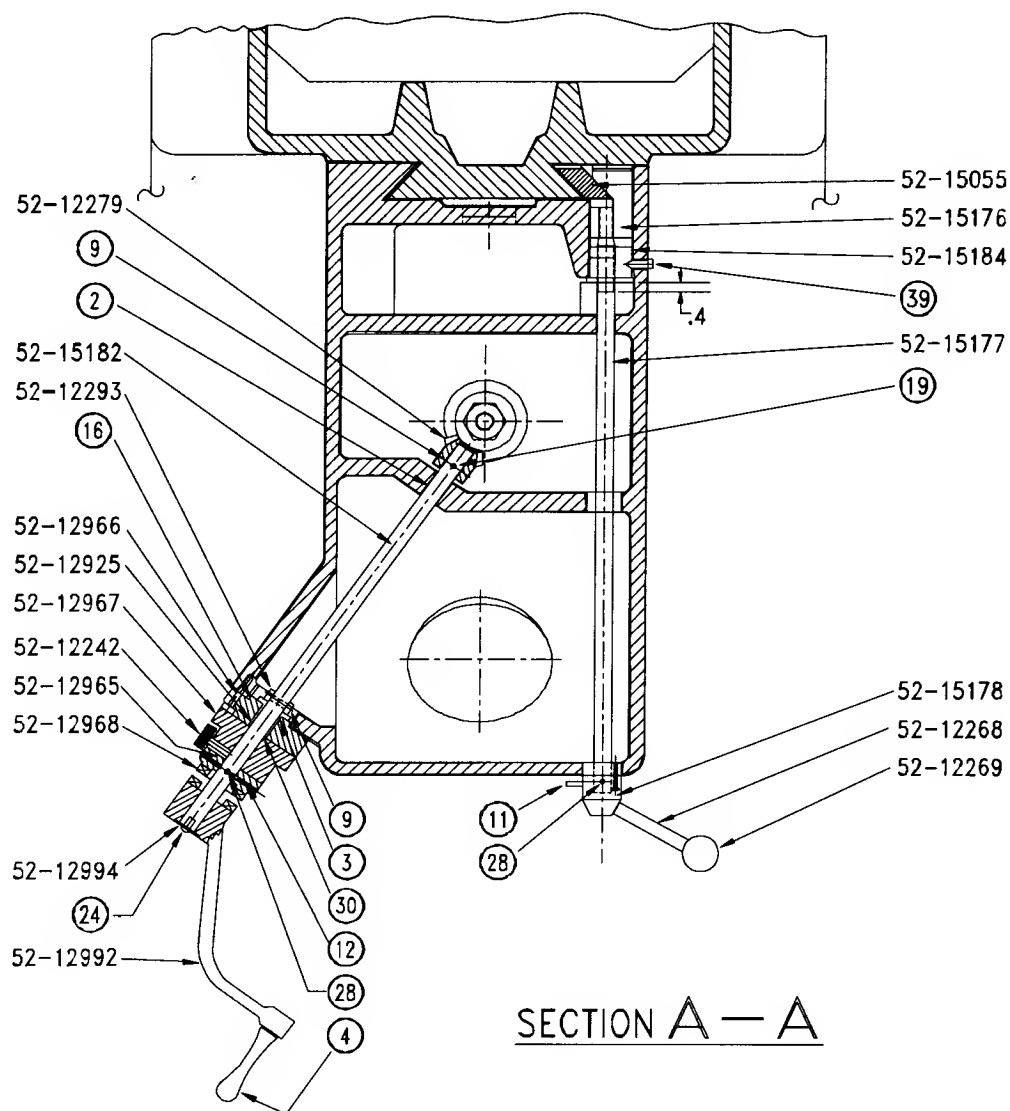
52-12326	1	Leadscrew
52-15042	1	Table

PARTS FOR 48" LONG TABLE

52-12929	1	Leadscrew
52-15048	1	Table

PARTS FOR METRIC MACHINE

52-13575	3	Dial-Table & C/S
52-13580	1	Dial-Knee
52-13581	1	Knee Lead Screw
52-13582	1	Base Screw Nut
52-13583	1	Lead Screw – 36" Table
52-13585	1	Lead Screw – 42" Table
52-13587	1	Lead Screw – 48" Table
52-13593	1	Cross Slide Lead Screw
52-15256	1	Table Nut
52-15258	1	Cross Slide Nut

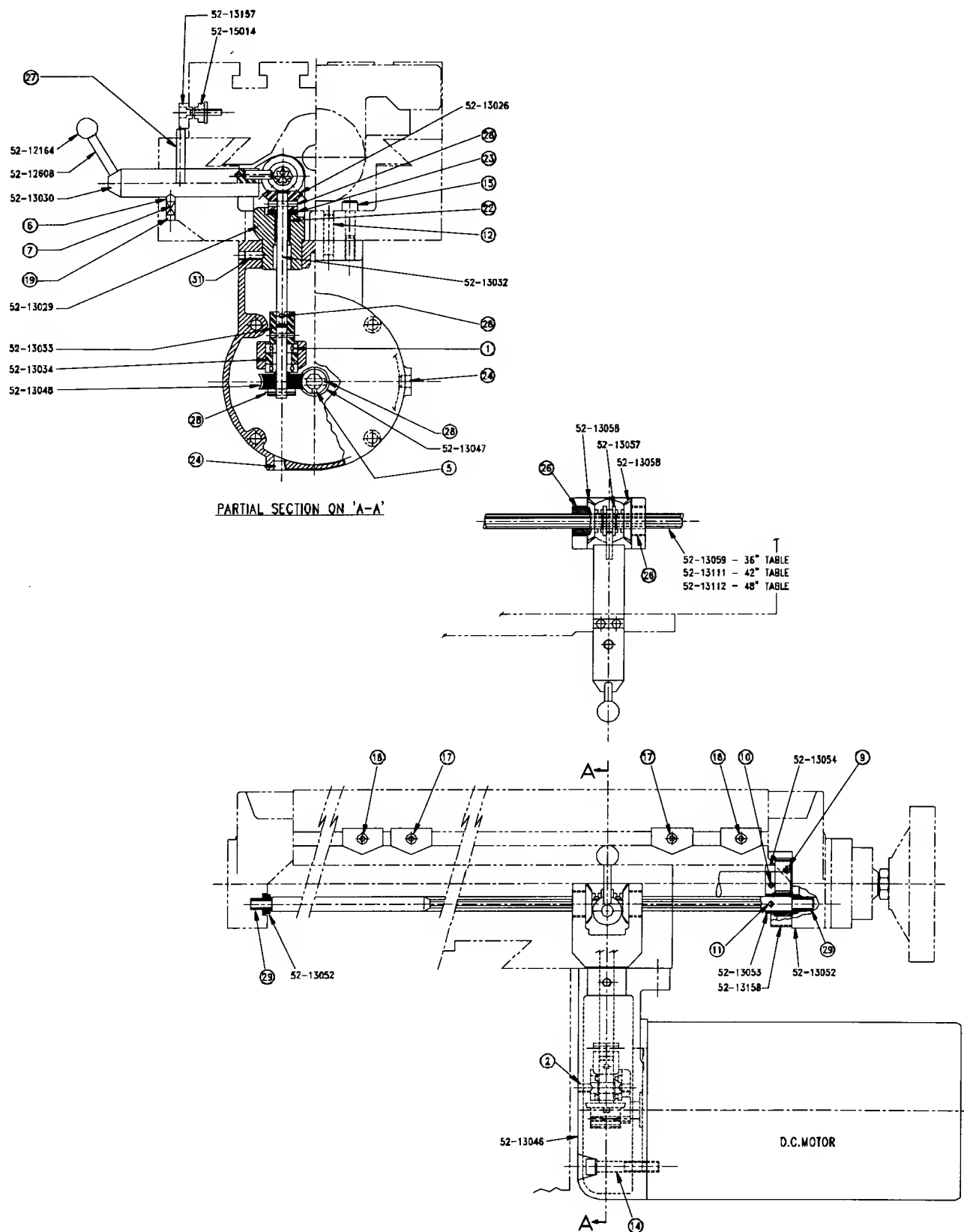


Det. No.	Qty.	Description
1	4	Ball Bearing - ND #477504
2	1	Bearing Oilite #AA-1043-6
3	1	Flange Bearing Oilite #FF-1014
4	1	Handle XLO #H3C
5	1	Retaining Ring - Spirolox #RR24
6	1	Bearing - R & M #MJ-25-WSRR
7	1	Jam Nut - $\frac{7}{8}$ - 14
8	4	Roll Pin $\frac{3}{16}$ Dia. X $1\frac{1}{2}$
9	2	Spring Pin $\frac{1}{4}$ Dia. X $1\frac{1}{4}$
10	1	Spring Pin $\frac{3}{16}$ Dia. X 1"
11	1	Spring Pin $\frac{3}{16}$ Dia. X $1\frac{3}{4}$
12	1	Spring Pin $\frac{3}{16}$ Dia. X $2\frac{1}{2}$
13	1	Cover-Spae-Naur #B174ON
14	3	Soc. Hd. Cap Scr. $\frac{5}{16}$ -18 x 2
15	3	Hex. Hd. Bolt $\frac{1}{2}$ -13 x $1\frac{1}{4}$
16	5	Soc. Hd. Cap Scr. $\frac{1}{4}$ -20 x 1
17	2	Soc. Hd. Cap Scr. $\frac{1}{4}$ -20 x $\frac{3}{4}$
18	8	Butt Hd. Soc. Scr. #10-24 x $\frac{5}{16}$
19	1	Soc. Set. Scr. $\frac{5}{16}$ -18 x $\frac{1}{4}$
20	4	H.H.S. $\frac{1}{4}$ -20 x $\frac{5}{8}$
21	2	Jam Nut $\frac{3}{4}$ -16

Det. No.	Qty.	Description
22	4	Jam Nut $\frac{5}{8}$ -18
23	2	Pipe Plug $\frac{3}{4}$
24	1	B.H.S. $\frac{1}{4}$ -20 x $\frac{1}{2}$
25	6	Dowel Pin $\frac{5}{16}$ x $1\frac{3}{4}$
26	1	S.H.S. $\frac{3}{8}$ -16 x $\frac{1}{2}$
28	3	S.S.S. $\frac{1}{4}$ -20 x $\frac{3}{8}$ CN. PT.
29	1	S.T.S. 4-40 x $\frac{3}{8}$
30	1	S.S.S. 6-32 x $\frac{1}{8}$ CN. PT.
31	3	S.S.S. 6-32 x $\frac{1}{4}$ CN. PT.
32	1	S.S.S. 10-32 x $\frac{1}{4}$ CN. PT.
33	4	S.H.S. $\frac{5}{16}$ -18 x $\frac{3}{4}$
34	4	S.H.S. $\frac{5}{16}$ -18 x $1\frac{1}{2}$
35	4	S.H.S. $\frac{3}{8}$ -16 x $\frac{1}{2}$
36	2	Dowel Pin $\frac{5}{16}$ x 1
37	2	Plug Button
38	4	Drive Screw 4 x $\frac{5}{16}$
39	1	S.S.S. $\frac{5}{16}$ -18 x 1 CN. PT.
40	1	Spring Pin $\frac{3}{16}$ x $1\frac{1}{4}$
41	2	S.H.S. $\frac{3}{8}$ -16 x $1\frac{1}{4}$

Table Power Feed Assembly

No. 52-15140



Parts List for Table Power feed

No. 52-15140

Dwg. No.	Qty.	Description
52-12608	1	Lever
52-12614	1	Ball
52-13026	1	Miter Gear
52-13029	1	Miter Gear Bracket
52-13030	1	Engaging Shaft
52-13031	1	Rod
52-13032	1	Rod
52-13033	1	Coupling
52-13034	1	Spacer
52-13046	1	Housing
52-13047	1	Worm
52-13048	1	Worm-Gear
52-13052	2	Thrust Washer
52-13053	1	Drive Gear
52-13057	1	Feed Coupling
52-13058	2	Mitre Gear
52-13157	4	Table Stop Dog
52-13158	1	Guard
52-15014	2	Tee Nut

SELECT ONE (CHECK MILL TABLE LENGTH)

52-13059	1	Sliding Shaft 36" Table
52-13111	1	Sliding Shaft 42" Table
52-13112	1	Sliding Shaft 48" Table

PARTS FOR INCH MACHINE

52-13054	1	Lead Screw Gear
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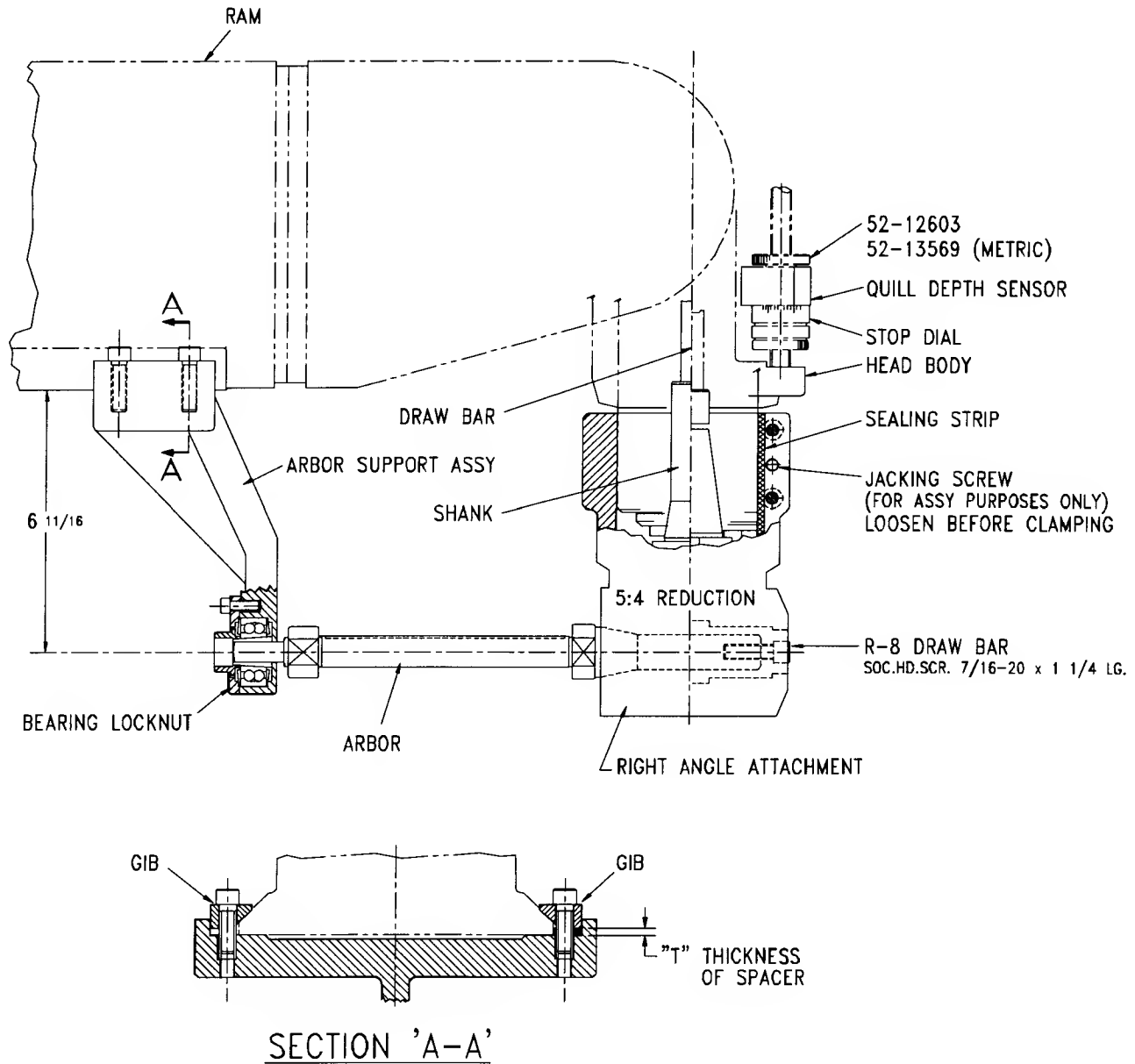
PARTS FOR METRIC MACHINE

52-13021	1	Lead Scr. Gear (Metric Screw)
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Det. No.	Qty.	Description
1	2	Bearing SKF 6001
2	2	Sc. Set Scr. $\frac{1}{4}$ -20 x $\frac{3}{8}$ NYLOCK
5	1	Key $\frac{3}{16}$ Sq. x $1\frac{1}{4}$
6	1	Ball $\frac{1}{4}$ dia.
7	1	Spring $\frac{1}{4}$ dia. X $\frac{3}{8}$ lg. .031 wire
9	2	Button Hd. Scr. Self-tapping #10-32 x $\frac{1}{2}$
10	1	Roll-pin $\frac{3}{16}$ x $1\frac{1}{2}$ lg.
11	1	Roll-pin $\frac{3}{16}$ x $\frac{3}{4}$ lg.
12	2	Dowel-pin $\frac{5}{16}$ x $1\frac{1}{2}$ lg.
14	4	Sc. Hd. Cap Scr. $\frac{3}{8}$ - 16 x $2\frac{1}{4}$ lg.
15	4	Sc. Hd. Cap Scr. $\frac{3}{8}$ - 16 x $1\frac{3}{4}$ lg.
17	2	Sc. Hd. Cap Scr. $\frac{1}{4}$ - 20 x $\frac{5}{8}$ lg.
18	2	Sc. Hd. Cap Scr. $\frac{1}{4}$ - 20 x $1\frac{1}{4}$ lg.
19	1	Sc. Set Scr. $\frac{5}{16}$ - 18 x $\frac{1}{4}$
22	1	Bearing $\frac{7}{16}$ x $\frac{5}{8}$ x 1 lg. Oilite #AA-627-4
23	1	$\frac{1}{2}$ x 1 x $\frac{1}{8}$ Oilite #TT-1001-1
24	2	Pipe Plug $\frac{1}{4}$ pipe, Hex-Sc.
25	1	Dowel Pin $\frac{5}{16}$ x 1 lg.
26	2	Nylon Bearing Thomson 14L 7 $\frac{1}{2}$ - FK
27	2	Stop Feed Plunger $\frac{5}{16}$ x 2 lg. Dowel
28	5	Roll-pin $\frac{3}{16}$ x 1 lg.
29	2	Bearing $\frac{5}{16}$ x $\frac{1}{2}$ x $\frac{5}{8}$ lg. Boston #FB-58-5
30	1	Lubr. Label L P00 22 XLO Code EP-5-G
31	1	Sc. Set Screw $\frac{5}{16}$ - 18 x $\frac{3}{4}$ lg. cone pt.

Right Angle Attachment and Horizontal Milling Attachment

No. 52-12821 & 52-16102



Mounting Right Angle Attachment

ASSEMBLY No. 52-12821-R8 SHANK
ASSEMBLY No. 52-12821-40 MMT. SHANK

Prepare attachment by backing off completely 2 clamping screws and tightening centre jacking screw to spread bore slightly.

Extend quill out to minimum of 4" beyond head body. Fit attachment onto quill body, position shank in spindle taper and tighten draw bar. Back off centre jacking screw, insert felt sealing strip, rotate attachment to desired position and clamp.

If fixed position is required, clamp quill depth stop between stop dial and detail #52-12603.

To align attachment for normal machining use dial gauge mounted on table and clock machined pads on attachment.

To align attachment for accurate machining use dial gauge mounted on table and clock off arbor mounted in R8 taper bore in attachment.

Mounting Horizontal Milling Attachment

ASSEMBLY No. 52-16102

Align Head Square to top of table as shown in operating instructions on Page #6. Extend Ram forward approximately 6" and mount arbor support assembly to Ram Dovetail. Mount right angle attachment as described opposite. Place arbour in spindle & adjust height of right angle attachment until arbour support bracket bearing aligns with arbour. Tighten locknuts on quill depth stop. With bearing locknut loose, slide arbour support bracket forward into position & tighten bearing locknut, and mounting screws. With the aid of a dial indicator align arbour square to table 'T' slot, by swiveling turret. Alternately adjust thickness 'T' of spacer. NOTE: .001 change in thickness of spacer corresponds to .001 movement sideways.

Dis-assembly Note: When dis-assembling, back off bearing locknut 2 turns and tap lightly to break bearing taper.

Anti-Backlash Nut Assembly

Table and Cross Slide Leadscrew – No. 52-15025 DWG.

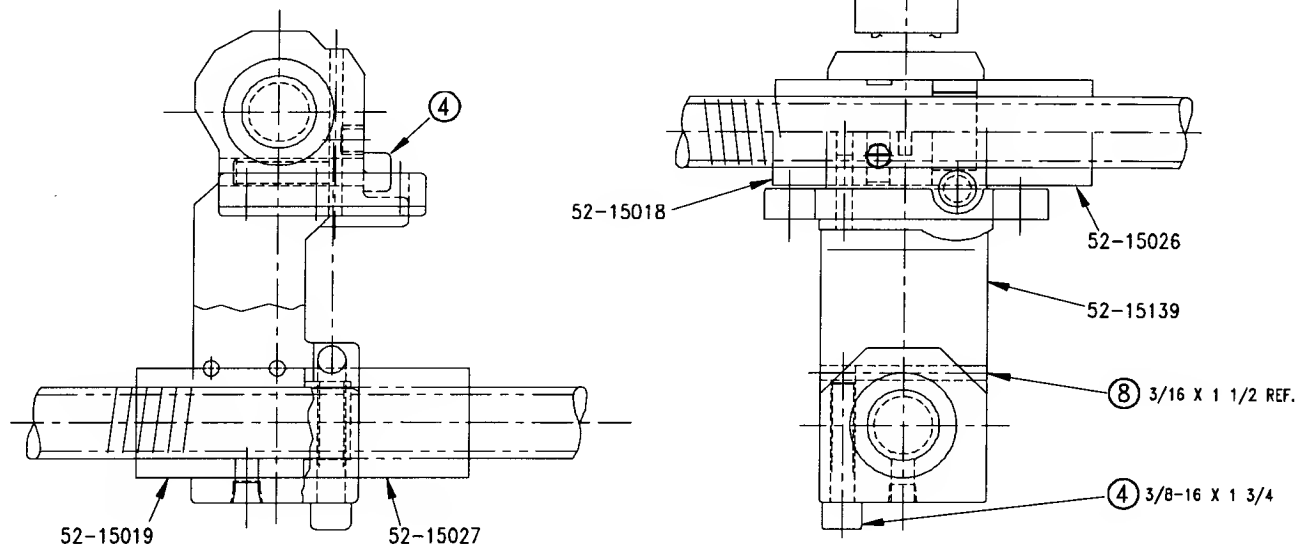
ADJUSTING INSTRUCTIONS

Access to table backlash nut adjusting screw (detail #1) is thru hole in rear surface of cross slide.

Access to cross slide back lash nut adjusting screw (detail #1) is thru cored hole in sloping face of knee.

To take up backlash for both table and cross slide lead-screws insert $\frac{5}{16}$ A/FLATS Hex. Key into detail #1 and turn clockwise until slight drag is felt when rotating lead-screw handwheel. DO NOT OVER TIGHTEN.

If over tightened turn detail #1 anti-clockwise for two complete turns and give head of detail #1 a slight tap until tightness is released. Follow the take up procedure until required backlash is then obtained.



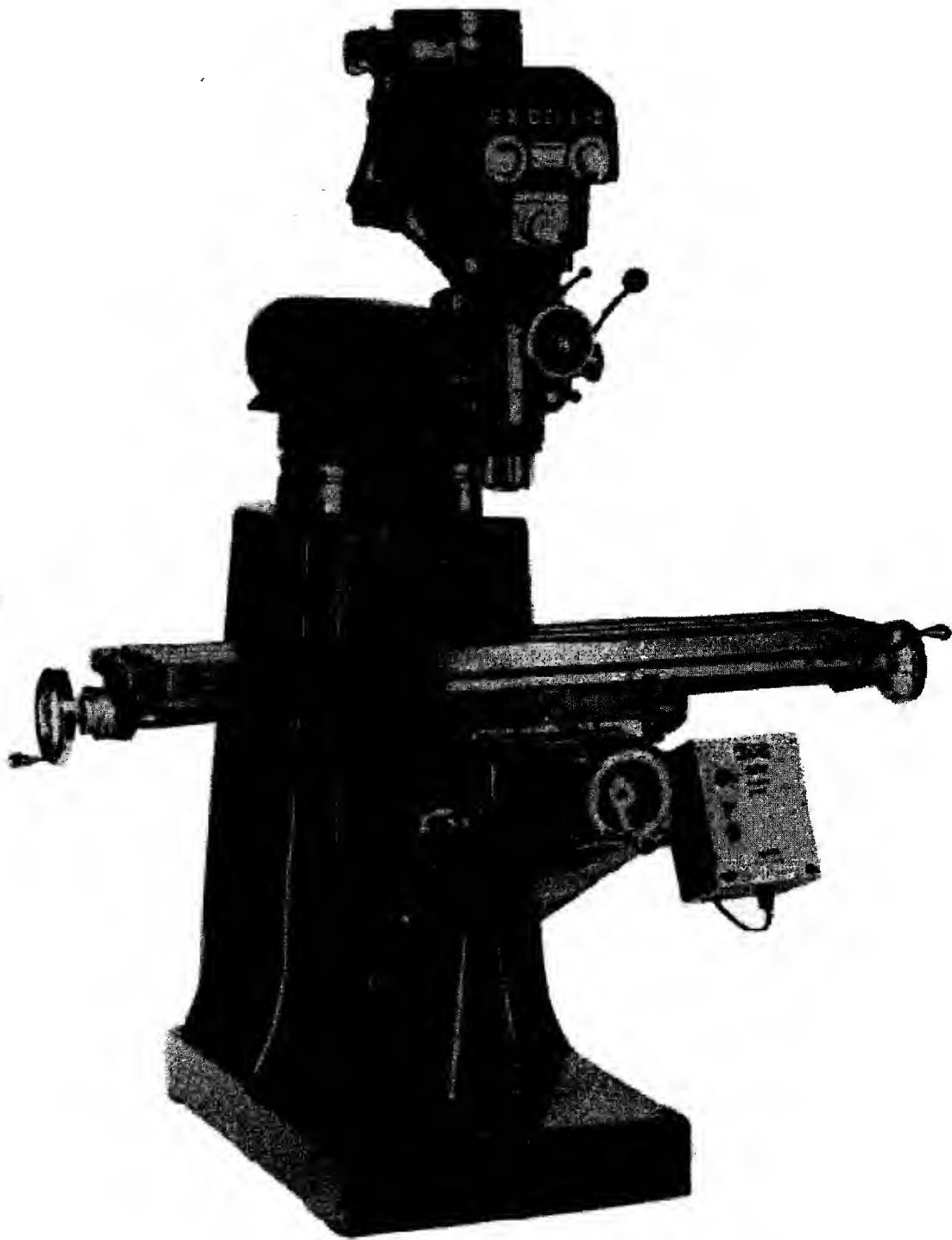
Parts List for Assembly

PARTS FOR INCH MACHINE

Dwg. No.	Qty.	Description
52-15026	1	Anti Backlash Table Nut
52-15027	1	Anti Backlash C/S Nut
Det. 4	2	Soc. Hd. Cap Scr. $\frac{3}{8}$ -16 x 1 $\frac{3}{4}$

PARTS FOR METRIC MACHINE

Dwg. No.	Qty.	Description
52-15257	1	Metric Anti Backlash Table Nut
52-15259	1	Metric Anti Backlash C/S Nut



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